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WHILE the transportation system of the United States Steel Corporation, which is described elsewhere in this issue, was established primarily for the transportation of the raw materials of the Corporation, all the units of it except the steamship lines are common carriers competing actively for all classes of traffic. The various units were acquired during a period when the railways were not regulated as they are now, and they were a valuable asset to the mills in their negotiations with the other roads for the handling of their immense traffic. This was especially true of the Bessemer & Lake Erie, which was built by the Carnegie Steel Company several years before the formation of the Corporation. An impression prevails that the Corporation's lines have a monopoly of the transportation of its materials. As indicated in the article referred to, this is not the fact. While a large part of the Steel Corporation's materials is carried by its own transportation system, it is dependent to a large extent upon other lines at every point, so that it has outside conditions to meet. The student of railway operation may draw a number of instructive lessons from this system. In the first place, it is more highly organized and officered than the average railway system. Although subject to one central control, each unit is in charge of an operating officer and staff who devote their entire attention to the one property, and who operate it independently as regards its local problems. This close supervision is carried down to the details of the actual train movements. Few roads provide three despatchers for 225 miles of line, part of which is branch track, or have four trainmasters supervising train movement on the same mileage, as is done on the Bessemer. The handling of an exceedingly heavy tonnage and a considerable passenger traffic on a line not entirely provided with double track, with the remarkable regularity attained by the Bessemer, is an indication of the success resulting from these measures. The loading of all cars to an average of 97 per cent. of their capacity, including overload, is an example of the results gained by supervision of details. It should also be borne in mind that this tonnage is practically all handled in a week of six days, for wherever possible Sunday work is eliminated, and no freight trains are started out of a terminal from Saturday night until Monday morning, although trains on the road are permitted to continue to their terminals.

EQUALLY interesting to a railroad man is the success attending the efforts of the Bessemer to develop a northbound traffic to offset the heavy ore movement southbound, which is in itself an unusual and highly creditable record. From present indications this northbound traffic will equal if not exceed the southbound movement within a couple of years. Another interesting feature which should be noted is the substitution of machinery for labor in the handling of all the ore from the mine to the furnace, although the ore is handled at least five or six times in its movement. From the standpoint of the Steel Corporation, the greatest value of its transportation system consists in the maintenance of a continuity of supply of raw materials with a minimum of storage and rehandling, which it is considered is rendered possible only by complete control of the transportation facilities. The existing flexibility of operation resulting from the possibility of diverting shipments from a congested point and concentrating equipment at such a point, could not be maintained if the system were operated as several entirely independent units. As shown in our descriptive article, the season's schedule of operation of the railroad and the vessels anticipates the demands of the mills, and enables all the properties from the mines to the Union road, serving the furnaces at Pittsburgh, to plan their work and execute it in harmony with this program. The failure of any one unit to do its work on schedule may be exceedingly serious. For instance, if the mills are unable to unload cars, the Bessemer is then unable to deliver cars at the dock for loading, the vessels are delayed in leaving the lower lake ports and in returning to the docks at the head of the lakes, the docks become congested with ore and eventually the steam shovels are forced to

shut down in the pits. The necessity for keeping all facilities in operation is especially urgent on the roads on the Range, for a slight delay will produce congestion and tie up the mines.

THE coroner who investigated the North Haven collision on the New Haven has made a report, holding the conductor and flagman of one train and the engineman of the other responsible, and recommending that they be prosecuted. He attributes the collision to the failure of these employees to obey the rules of the company with which they were familiar. Whether these men should be punished is one question. Whether as a general proposition railway employees whose careless or reckless conduct causes people to be injured or killed should be punished, is another question. The theory of our law is that every one whose misconduct or negligence causes injury or death ought to be punished. This is also the theory of the law in other countries; and in some other countries it is rigorously applied. Professor Cunningham, in his paper on "The Administration of the State Railways of Prussia-Hesse," has told us that on these railways "discipline for infraction of the rules is severe. Guilty employees are not only reprimanded, suspended, fined or dismissed, but in flagrant cases they are imprisoned. In 1910 there were 132 cases of criminal prosecution, and 81 employees were given court sentences." Probably on no other leading system of railways are there so many infractions of rules resulting in serious accidents as on the railways of the United States. Seldom, however, has it been found practicable to get prosecutors to prosecute or juries to return verdicts against railway employees whose misconduct has caused accidents. The public and public officials in this country seem to think that the railway employee who has caused an accident is a proper object, not of prosecution, but of sympathy. They appear to assume that his action must have been due to his environment, or to inherited traits, and that, therefore, the society into which he has been born, or the railway by which he is employed, or the grandfather or great-grandfather from whom he inherited his characteristics, should be indicted. Instead of demanding that employees shall not cause accidents, they demand that the railways shall be so equipped that when employees do cause accidents, they will not kill so many people. The theory of the law is that crime is personal, and that a man should be assumed to know and be responsible for the probable results of his own acts. The theory of the public and of public officials, apparently, is that an engineman or a flagman is an infant or automaton who does what he does and fails to do what he fails to do because of the operation of forces within and without him over which he has no control. "It may be," said Professor Cunningham in reference to the Prussian-Hessian state railways, "that the methods there employed to investigate accidents and mete out punishment to the careless have a direct bearing on their remarkable immunity from casualties." In England the methods of investigation and punishment are very similar, and there, as in Prussia, we find the same remarkable immunity from accidents. It may be that the principles according to which the Prussians and the English act are harsh and cruel. It may be that they are wrong in assuming that the railway employee, like other men, is responsible for the results of his own acts and that he, and not his ancestors, or the society into which he happens to have been born, or the railway whose rules he has violated, should be punished. But can a rational mind conclude that there is no significance in the fact that in Prussia and England, where, as we have seen, such rude and antiquated conceptions of individual responsibility and duty obtain, the number of accidents due to the failure of railway employees to perform their duty is extremely small, compared with the number due to the same cause in the United States? Until comparatively recent years the railway problem which attracted the most attention in this country was that of rebating. That practice has now been almost extirpated. How was this done? It was done by public opinion and the law refraining from wasting maudlin sympathy on the individuals who gave and received the rebates, and be-

ginning to prosecute and punish, not only the railways and industrial concerns with which they were connected, but the individuals themselves. Is there or is there not a lesson regarding railway accidents in the United States in the experience of Prussia and England in dealing with railway accidents and in our own experience in dealing with railway rebating?

WANTED: A SENSE OF RESPONSIBILITY AND DUTY.

TO the reflecting mind such accidents as the recent one on the New Haven and the hysterical investigations and discussions of it do not suggest merely the question, What is the matter with American railways? They suggest the much broader and deeper question, What is the matter with the American people? The accident record of the railways of the United States is bad. But it is not the railways alone that are killing people. The factories are killing them. Preventable diseases are killing them. Automobiles are killing them on every city street and country road. The man who doesn't know that the gun with which he is fooling is loaded, and the man who knows that the gun he is carrying is being carried contrary to law, are killing them. Homicides, and accidental deaths hardly, or not at all, distinguishable from homicides, have become so prevalent in Chicago that the coroner has organized a commission on public safety composed of prominent citizens to investigate the causes and remedies for all such fatalities. Coroner Hoffman seems to be one of the very few people in this country who have grasped the vital and fundamental fact that fatalities due to railway accidents, automobile accidents, industrial accidents and murder, are all species of one genus. They are all traceable to the same underlying cause, and, therefore, should all be studied and dealt with in much the same manner. To state the matter in another way, railway accidents in the United States are not, as is so commonly assumed, a disease, but merely a symptom, a manifestation of a disease which is eating like a cancer into American life. That disease is an almost universal carelessness and recklessness of conduct on the part of almost all classes of people, and it is due, first, to a lack of a sense of individual responsibility and duty, and second, to a lack of machinery, or of efficient operation of the machinery, for compelling those who have no adequate sense of responsibility or duty to assume their responsibility and do their duty.

That the sense of individual responsibility and duty is wanting is shown by the fact that almost every time a homicide or an accident occurs, everybody who contributed to it begins, not hypocritically, but seriously and honestly, to try to show that the blame for it rests on some other person or persons, or on society as a whole. That the machinery for fixing responsibility and applying preventive and punitive remedies does not exist or has broken down, is shown by the fact that terrible preventable crimes and accidents of all kinds continue to occur, and that usually nobody is brought to book for them. Very commonly the only thing they lead to is a deal of inane and insane clamor, and, unfortunately, the clamor is participated in not only by those who cannot be expected to know the causes and remedies, but also by those who ought to know them. After the New Haven wreck not only did the newspapers publish innumerable news articles and editorials which showed that the writers knew nothing about the causes and remedies of railway accidents, but, unless they were grossly misquoted, some high public officials charged especially with the duty of studying and regulating railway operation gave expression to ideas and sentiments that were adapted grossly to mislead public opinion and to produce no effect on accidents. One of the suggestions attributed to certain high regulating authorities was that the rules should prohibit trains from making up lost time. If enginemen cannot now be got to obey the rules requiring them to run with their trains under control in fogs, and to stop at stop signals, how are they to be got to obey a rule

prohibiting them from making up lost time? And if this proposed rule ought to be enacted into law, as has been intimated, why ought not all rules pertaining to safety? And if they were, and employees violated them, against whom should the laws be enforced—the railway that told its enginemen to obey the law, or the enginemen that broke it?

The lack of the proper sense of individual responsibility and duty which is really at the root of the causes of railway accidents runs through all classes of persons. The financiers who hold railway purse strings often interfere with the operation of the properties, compelling reductions in expenses which are contrary to the sound judgment of the operating officers and causing the physical facilities to be impaired and the lines to be under-officed, without any apparent realization of the fact that there is any connection between their vicious financial policies and the long roll of railway casualties. The active managers ought stubbornly to resist such ignorant and short-sighted meddling, but they do not always do so. They often proceed on the assumption that the responsibility for unsafe reductions of expenditures rests entirely on those who order them. Likewise, the active managers ought perseveringly and courageously to put forth every effort to so select, train and discipline subordinate officers and employees as to reduce to the minimum the careless and reckless conduct of employees which is the cause of a very great majority of all casualties, except those to trespassers. Every accident caused by the ignorant, careless or reckless conduct of an employee is an indictment of all his superiors, from those with whom he comes in direct contact up to the chairman of the board and the board of directors, and of each of them individually. Do railway officers generally feel this fact as keenly as they should and act accordingly? The answer is the admitted lack of discipline among the employees of American railways. The conditions on some roads are better than on others. But where is the manager who dares say that discipline on his road is as satisfactory as it could be and ought to be made?

When we turn to the employees, especially those concerned with train operation, we find a most deplorable absence of a sense of responsibility and duty. The engineman who carelessly runs past a signal and kills a score of people is never to blame, according to his own notion; the road is to blame; it should have provided automatic stops. Or the flagman is to blame; he should have flagged better. Or the superintendent or the general manager is to blame; he insisted on trains running on time; and, obviously, the superintendent or general manager should insist on trains always running behind time! And, of course, the flagman is never to blame; it is always the engineman, or the weather, or the management. The evidence may show that the engineman or flagman, whose failure to obey a rule or order caused a catastrophe, had been habitually taking chances in violation of rules and orders. Does this lead other enginemen and flagmen to feel a greater sense of responsibility and duty and to stop taking chances? Apparently not. Again and again terrible disasters have been shown to be due to such causes, and yet, while fully knowing this, employees keep right on taking chances.

Congress and the Interstate Commerce Commission are quite as efficient at "passing the buck"—not to say "bunk"—and at not doing anything really to stop accidents. They control how much railways may earn, and therefore how much they may spend to increase safety, and they are using their power to control railway earnings in a way that directly tends to prevent the roads from being adequately officered and from making needed physical improvements. The commission has had authority for years to investigate and make recommendations regarding accidents. It knows, and members of Congress who discuss railway accidents ought to know, that a vast majority of the fatalities are not due to defects of the physical structures and equipment, but to a lack of discipline on the part of employees and to trespassing

on railway property; yet, Congress and the commission have done almost nothing to improve these conditions. When, however, a serious accident occurs, members of Congress and the commission, forgetful, apparently, of the fact that they have a responsibility that they have not lived up to and a duty that they have not performed, immediately busy themselves with accusatory statements about, and investigations of, the railways. The Washington correspondent of one of the Chicago newspapers wired to his paper soon after the New Haven accident that Commissioner McChord of the Interstate Commerce Commission started the "safety first" movement on the railways. He could have said with equal accuracy that Commissioner McChord discovered the circulation of the blood or invented the solar system. Neither Mr. McChord nor anyone else connected with the commission had anything to do with starting the "safety first" movement. It was started by R. C. Richards, general claim agent of the Chicago & North Western. The commission has been so concerned about fixing the responsibility for accidents on the railways, and getting legislation, at the instigation of the railway brotherhoods, and of its accident investigators and safety appliance inspectors, who belong to the brotherhoods, to compel the roads to spend money, that it has had little time to do anything to really promote safety.

The state legislatures and railway commissions have been in the same boat with Congress and the interstate commission. They have compelled the railways to increase the size of their train crews, to use high power headlights and to do many other things that the railway brotherhoods have wished done, but the influence which they have exerted on railway safety has been negligible, except when it has been used in the wrong direction. Repeatedly the fact has been brought to the attention of the various railway regulating authorities that more than one-half of all the persons annually killed on railroads are trespassers, but from one end of the United States to the other there does not seem to be a single man of influence in public office who can be induced to take any interest in the more than 5,000 people who are annually slaughtered while trespassing on railway property. Their blood is on the heads of the lawmakers and the administrative public officials of America; but apparently they don't mind that so long as the railways continue to kill enough passengers to give them material for anti-railway agitations that will carry them into and keep them in office.

The press, by educating public opinion in regard to the causes of and remedies for accidents, could do a great deal to reduce their number. Unfortunately, the press makes very little effort to do so. The misleading news and comments that most newspapers publish regarding accidents more than neutralizes the effect of the correct news and sane comment that they sometimes publish. Here, again, the trouble is a lack of a sense of responsibility and duty. Obviously, it is the duty of the press to spare no effort to get the facts about accidents, and to publish news and comment regarding them which will present the situation to the public in its true proportions. But how many newspapers or other publications of general circulation do this? Because so few do it the American people no more know about the facts about railway accidents in the United States than they know the facts about the moral and religious conditions in Mars. Is it any wonder, in these circumstances, that the regulation of railways which the public causes, permits or condones has almost no tendency to reduce accidents?

Railway financiers, railway officers, railway employees, legislatures, railway commissions, the press and the public, all have their responsibility and duty in connection with railway accidents. Will there ever come a time when not merely a few of them, but all, will awaken to a sense of their real responsibility and begin fully to perform their duty? Until they do the railway accident problem will not be solved. It is not to be solved by railway officers accusing the em-

ployees, by employees accusing the managements, by public officials using accidents as a means of advertising themselves as saviors of the country or by the press using them as a means of increasing their circulation on the West Side of Chicago and the East Side of New York. Whether the sense of responsibility and duty which is necessary to reduce railway accidents can be developed without the development of the broader and more fundamental sense of responsibility and duty which is necessary to reduce homicides and all the various classes of deaths by violence in this country seems very questionable.

LEHIGH VALLEY.

WITH considerably more business in the year ended June 30, 1913, than in the previous year, the Lehigh Valley spent even more proportionately for maintenance, but succeeded in reducing the ratio of transportation expenses to total operating expenses from 34.16 per cent. in 1912 to 32.51 per cent. The increase in expenditures for maintenance of way was \$1,731,000, making the total for this account in 1913 \$5,694,000, or \$3,856 per mile of road. The increase in the amount spent for maintenance of equipment was \$1,248,000, making the total in 1913 \$7,561,000. It is true that the total tonnage of freight carried was 15 per cent. greater in 1913 than in 1912; but presumably this did not greatly affect maintenance costs, and the heavy expenditures for maintenance were, in large part, due to renewals and extensive replacement of old construction and equipment with new permanent structures and more modern rolling stock. Of course, the additional cost of such improvements is charged to capital account; but the entire cost of replacement in kind is charged to maintenance, so that an extensive program of betterment is generally reflected in materially increased maintenance expenses.

The reduction in the transportation ratio in the face of present labor conditions and the retroactive award in the firemen's wage controversy, etc., is worthy of note. The Lehigh Valley

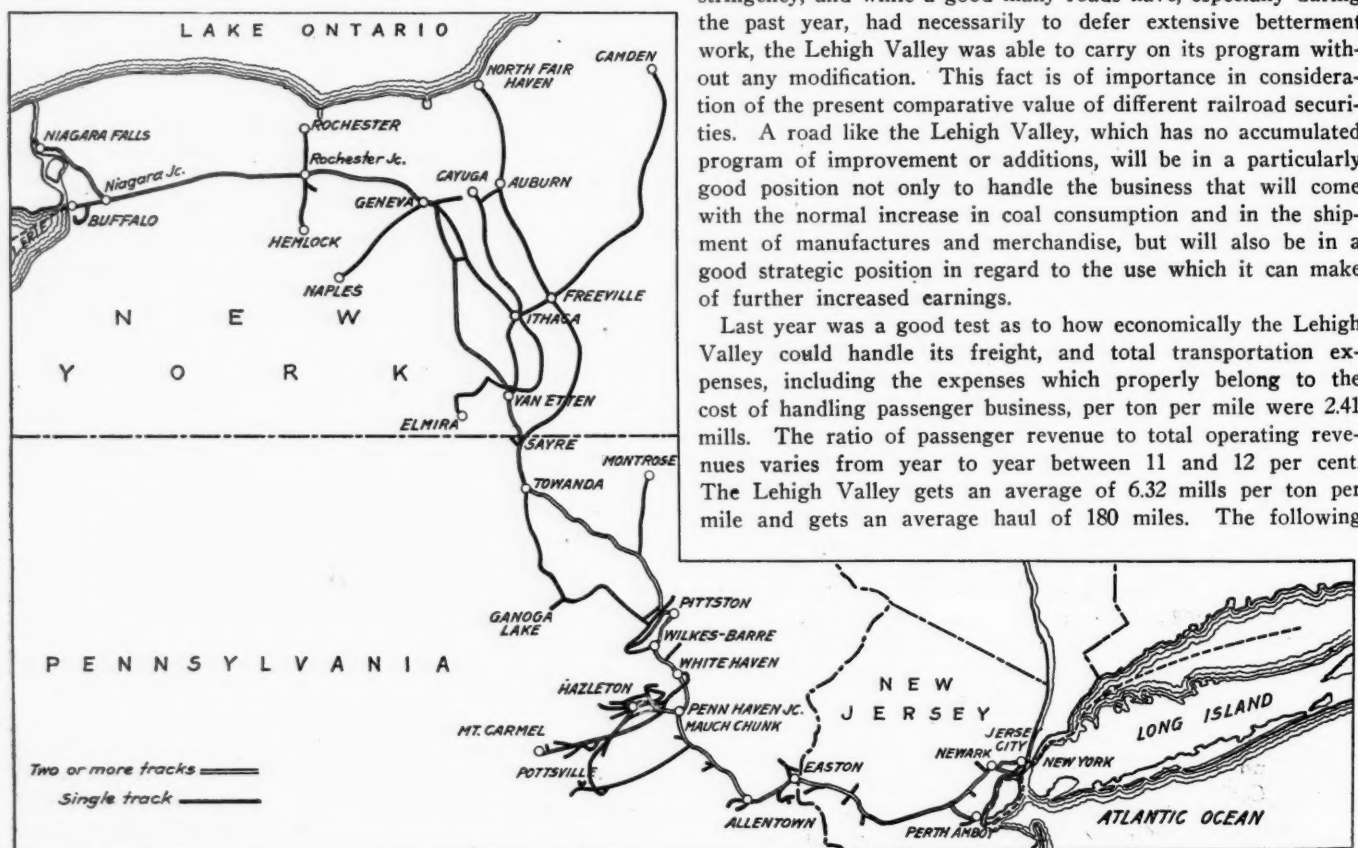
is now a double track road from Buffalo to New York. Extensive improvements and additions have been made in recent years and the plant is in shape to handle economically considerably increased business. Furthermore, the increase in business last year, while good in merchandise, was particularly large in the coal freight business. This was in part, of course, because conditions were not even normal in 1912; but from whatever cause, it probably helped the management to make a good showing in transportation costs. It also increased the average loading per loaded car and helped to give a larger average train load. The Lehigh Valley's car loading per loaded car averaged 24.42 tons in 1913 and 22.84 tons in 1912, and the train load, 599 tons in 1913 and 566 tons in 1912.

Notwithstanding the higher operating ratio—67.62 per cent. in 1913 and 66.98 per cent. in 1912—due to larger maintenance charges, net income, after the payment of fixed charges, was \$8,762,000 in 1913, as against \$6,813,000 in 1912. Dividends at the rate of 10 per cent. called for \$6,061,000. While the company had, therefore, only slightly more than enough to meet its dividend requirements in 1912, it showed a surplus in 1913 of \$2,700,000. The table at the end of these remarks shows in more detail the income account of the company.

The Lehigh Valley is in a particularly strong position as regards cash and working liabilities. Working liabilities at the end of 1913 totaled but \$5,349,000, while cash on hand amounted to \$13,149,000 and total working assets, including cash, to \$37,626,000. Although the company spent \$6,508,000 for additions and betterments (capital account), capital obligations were reduced by the retirement at maturity of \$2,015,000 equipment trust certificates.

There are probably few roads in the entire country that could spend for additions and betterments more than 10 per cent. of the total book value of their property without either issuing new securities, borrowing on short term notes or otherwise, or depleting its working capital. The Lehigh Valley management was farsighted in providing against the present money stringency, and while a good many roads have, especially during the past year, had necessarily to defer extensive betterment work, the Lehigh Valley was able to carry on its program without any modification. This fact is of importance in consideration of the present comparative value of different railroad securities. A road like the Lehigh Valley, which has no accumulated program of improvement or additions, will be in a particularly good position not only to handle the business that will come with the normal increase in coal consumption and in the shipment of manufactures and merchandise, but will also be in a good strategic position in regard to the use which it can make of further increased earnings.

Last year was a good test as to how economically the Lehigh Valley could handle its freight, and total transportation expenses, including the expenses which properly belong to the cost of handling passenger business, per ton per mile were 2.41 mills. The ratio of passenger revenue to total operating revenues varies from year to year between 11 and 12 per cent. The Lehigh Valley gets an average of 6.32 mills per ton per mile and gets an average haul of 180 miles. The following



The Lehigh Valley.

table shows the per cent. of each class of expenses to total operating revenues:

	1913.	1912.
Maintenance of way and structures.....	13.23	10.74
Maintenance of equipment.....	17.57	17.11
Transportation expenses.....	32.51	34.16
Traffic expenses.....	2.28	2.65
General expenses.....	2.03	2.32

As an indication of the way in which transportation expenses were held down, fuel per freight locomotive mile was 244 lbs. in 1913, as against 250 lbs. in 1912; water supply cost 0.60 cents per locomotive mile in 1913 and 0.64 cents in 1912; engine house expenses, 2.28 cents in 1913 and 2.33 cents in 1912; and locomotive miles run per pound of waste increased from 73.30 per cent. to 80.37 per cent.

The following table compares the principal figures for operation in the fiscal year ended June 30, 1913, with the 1912 fiscal year:

	1913.	1912.
Average mileage operated.....	1,451	1,441
Coal freight revenue.....	\$20,385,389	\$16,301,316
Merchandise freight revenue.....	16,339,749	14,591,240
Passenger revenue.....	4,867,554	4,703,734
Total operating revenues.....	43,043,372	36,905,935
Maint. of way and structures.....	5,694,422	3,963,589
Maint. of equipment.....	7,561,271	6,313,317
Traffic expenses.....	982,858	980,117
Transportation expenses.....	13,993,617	12,606,962
General expenses.....	875,651	856,266
Total operating expenses.....	29,107,820	24,720,250
Taxes.....	1,447,205	1,312,012
Operating income.....	12,208,137	10,582,434
Total income.....	14,511,892	12,698,896
Net income.....	8,761,828	6,813,020
Dividends.....	6,060,800	6,060,800
Surplus.....	2,701,028	752,220

BROOKLYN RAPID TRANSIT.

THE operation of the Brooklyn Rapid Transit is a unique problem, in that it combines the operation of electrified steam lines over private right-of-way; elevated lines, which were originally built for and operated as steam lines; and city surface railways. In all, there are 241 miles of first track operated and a total of 544 miles of all tracks, including turn-outs. To this there will be added about 240 miles of additional track when the subway extensions into Manhattan have been built, in accordance with the plans for the New York so-called dual subway and elevated system. Beside having very many of the same problems of operation, of relations with its employees, etc., that a steam road has on its suburban business, the Brooklyn Rapid Transit, of course, in its relations with the public it serves, is in a position closely analogous to that of a steam road serving a suburban population.

Since, however, the average figures are a combination of so many different kinds of figures, their chief interest lies in the results that the total shows, and it is quite impossible from the combined figures to form any idea of the operation of any separate part of the property. Security holders of the B. R. T. and railroad men who are interested in what this company may do when it comes to competition with the Interborough Rapid Transit, are, therefore, left largely to form their opinion of the future from the net results that are being shown in the present.

In 1913 the B. R. T. earned gross from operation \$24,152,000, an increase of \$926,000, or about 4 per cent., over 1912. This is very close to the normal increase which has taken place from year to year since 1902. During those 12 years the gross earnings have not quite doubled. In 1913 the company earned net, after paying operating expenses, \$11,659,000. This is an increase of 6.6 per cent. in net, and whereas gross has not quite doubled in 12 years, net has almost tripled. Net income, after the payment of fixed charges and taxes, amounted to \$4,497,000 in 1913, which is more by \$786,000, or 21 per cent., than in the previous year. During the last quarter of the year the company increased its annual dividend rate from 5 per cent. to 6 per cent.; but even with the somewhat larger dividend payments, the company showed a credit to profit and loss on its balance sheet at the end of 1913 of \$7,905,000, which is greater by \$2,041,000 than that shown at the beginning of the year.

Some idea of at least the results which the company is obtaining may be had from a study of the comparative statistics for the years 1902-1913 inclusive. During that period the passenger earnings per passenger have decreased slightly, being 3.83 cents in 1902 and 3.74 cents in 1913. Total operating charges, however, have decreased from 2.57 cents per passenger in 1902 to 2.05 cents per passenger in 1913; the 1913 figure being the lowest in the company's history and comparing with 2.08 cents, the best previous showing, made in 1910, and 2.11 cents in 1912. The proportion of total operating earnings spent for repairs and renewals has increased from 15.81 per cent. in 1902 to 16.39 per cent. in 1913, while general operating expenses, which correspond very roughly with transportation expenses on a steam road, have decreased from 42.85 per cent. in 1902 to 33.53 per cent. in 1913, the 1913 figure being the lowest in the company's history and comparing with 33.89 per cent., the lowest previous figure, made in 1912. Damages, which in 1902 cost the company 6.88 per cent. of total operating revenues, have been continually and consistently hammered at, until in 1913 these expenses amounted to but 2.51 per cent. of the total earnings. This compares with 2.95 per cent., the figure made in 1912, which was the best theretofore in the company's history.

The annual report of the Brooklyn Rapid Transit this year is of particular interest because it gives, if not the first comprehensive, at any rate the first condensed and easily comprehensible summary of the Brooklyn Rapid Transit's program for its share of the new subways and elevated lines that are to be built to comprise the dual system which has during the past year been approved by the Public Service Commission and New York City. Of the B. R. T.'s 544 miles of track, all of the elevated, except that on the Brooklyn and Williamsburg bridges and, in addition, 56 miles of surface track, are to be combined with the lines which the city is to build, about 133 miles, with certain trackage rights and extensions to make the new 293 miles of the Brooklyn Rapid Transit's part of the dual system. The lines which are to be built by the city will cost, it is estimated, about \$100,500,000, and are to be leased to the B. R. T. for 49 years, beginning January 1, 1917, and are to be equipped by the B. R. T.* at an estimated cost, including the extension of present lines, of \$65,000,000.

The net revenue, after the payment of operating expenses, taxes and depreciation, of the entire new system (293 miles) is to be divided as follows: The Brooklyn Rapid Transit is to get \$3,500,000, representing the net earnings of existing roads (presumably the elevated), which it contributes to the new system; the B. R. T. is to get 6 per cent. on its new investment of \$65,000,000 prior to the beginning of permanent operation "and thereafter interest and 1 per cent. sinking fund"; the city is to get "interest and 1 per cent. sinking fund on its investment in cost of construction"; the remaining surplus is to be divided equally between the lessee and the city.

NEW BOOKS.

American Society for Testing Materials Index. Published by the American Society for Testing Materials, University of Pennsylvania, Philadelphia, Pa. 158 pages, 6½ in. x 9 in. Cloth, \$1.50; leather, \$2.

This index covers the contents of Vol. I-XII, inclusive, of the proceedings of this association, excluding only those portions relating to routine business. Vol. I contains the 28 bulletins issued at irregular intervals from 1898 to 1902. From the latter date the proceedings have been published annually. Titles of individual papers are distinguished from committee reports and specifications. A list of key words under which the various subjects are indexed appears in the front of this volume, and the index is also classified under subjects and authors.

*The Brooklyn Rapid Transit is not legally or technically the lessee of the operating company of the new system. The New York Consolidated Railroad Company was formed to operate the new system and all of the stock of this company is owned by the B. R. T., and its securities and the securities of its subsidiary companies are guaranteed by the B. R. T.

AN INTERESTING TRANSPORTATION SYSTEM.

The Lines of the U. S. Steel Corporation Form a Complete Chain from the Minnesota Mines to the Pittsburgh Mills.

The transportation system developed by the United States Steel Corporation for the movement of ore from the Minnesota ranges to the mills in the Pittsburgh and Chicago districts is an exceedingly instructive one to persons interested in efficient transportation methods. The high point to which this system has been developed as a transportation organization for commercial as well as for corporation traffic, the close correlation of the various units to produce regularity of operation and the elaborate meas-

from Conneaut Harbor, O., to North Bessemer, Pa., at the entrance to the Pittsburgh district; the Union Railroad, which performs a switching service between North Bessemer and the various mills located on this road and connecting lines in the Pittsburgh district, and the Elgin, Joliet & Eastern Railway, which performs a similar service in the Chicago district. The railway lines of the Corporation alone comprise 976 miles of main track and own 47,500 cars and 1,203 locomotives.

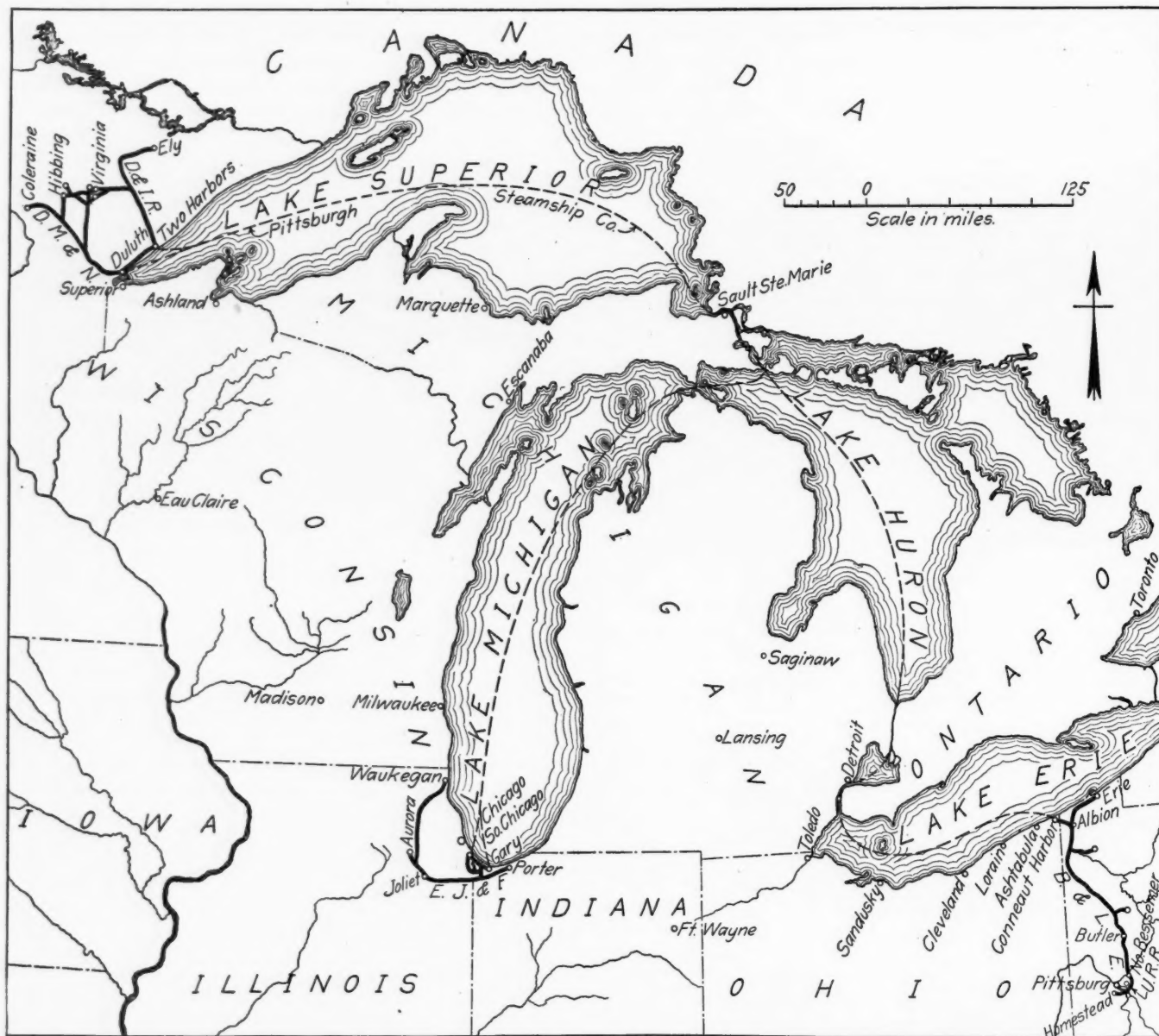


Fig. 1—Map of Rail and Boat Lines of the Steel Corporation.

ures adopted to secure economy of operation, afford many details of interest to railway men.

The principal units in this system are the Duluth, Missabe & Northern Railway, extending from the Missabe range in the vicinity of Hibbing and Virginia, Minn., to the docks at Duluth; the Duluth & Iron Range Railroad, extending from the Vermilion range, in the vicinity of Ely, Minn., and also from the Missabe range to docks at Two Harbors, with a branch along the lake to Duluth; the Pittsburgh Steamship Company, operating between the Lake Superior docks and Lake Erie and South Chicago ports; the Bessemer & Lake Erie Railroad, extending

While this system handles the greater part of the ore and other products of the Corporation, in no district is the Corporation independent of other transportation lines. On the Minnesota ranges, the Great Northern handled 14,000,000 tons of ore last year, while large quantities of Corporation ore were loaded at Ashland, Marquette, Escanaba and other Lake Superior ports, all of which was brought to the docks by independent roads. On the lakes the Pittsburgh Steamship Company is able to carry only 60 per cent. of the Corporation's ore, and it is necessary to charter other boats by the season or trip to carry the remaining 40 per cent. Likewise, large quantities of ore are hauled by the

Pennsylvania, Baltimore & Ohio, Lake Shore and other roads from Cleveland, Lorain, Ashtabula and other lower lake ports to the mills.

For the purpose of this study, that portion of the transportation system from the Missabe range via Duluth and Conneaut Harbor to the Pittsburgh district will be discussed as typical of the entire system. This study is especially interesting at the present time in view of the unusually large amount of ore which is now being handled. The tonnage loaded on all the ranges in the Lake Superior district last year was 48,221,546 tons as compared with 32,793,130 in 1911 and 43,442,397 in 1910, the latter being the previous high record. The shipments so far this season equal those for the corresponding part of last year, and for the entire year probably will exceed those of last year. Of the shipments for 1912, 32,047,409 tons, or 66 per cent., from the Lake Superior district came from the Missabe range. The ore from this range is carried to the lake by three roads, the Duluth, Missabe & Northern, the Duluth & Iron Range and the Great Northern. Because of the desire of the Steel Corporation to mine as

development of the mines including the stripping of the pits or the driving of the shafts and all operations to and including the loading of the ore on cars are handled by this company. Much the larger part of the ore mined on the Missabe range is taken from open pits, the operation of which is very largely a railway problem. The ore is usually found in deposits averaging 100 ft. thick, covered with an overburden of sand and gravel averaging about 45 ft. in depth, although in some cases pits have been stripped to a depth of 150 ft. By means of test pits the mining companies are able to determine whether the extent of the ore deposit and its quality will justify the expense of removing the overburden and mining in open pit, or it will be more economical to adopt the underground method of mining or an intermediate process known as milling. When it has been decided to operate a property as an open pit, the stripping is handled in practically the same way as a gravel pit is operated.

As soon as a body of ore is exposed, shovels are started loading the material. It is quite common for stripping and mining operations to be carried on simultaneously, and at some of the

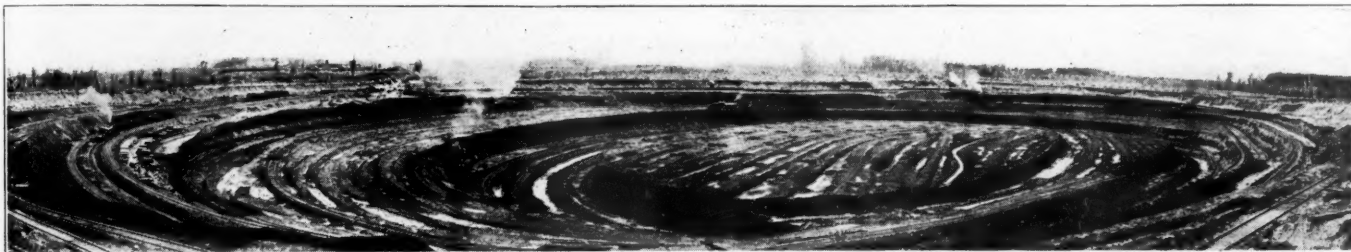


Fig. 2—A Typical Pit in the Missabe District with Circular Approach.

much ore as possible from the Great Northern properties before the expiration of the lease on these mines, this road handled an exceptionally large proportion of this traffic last year.

LOADING THE ORE.

At the beginning of each season a schedule of the ore requirements of the various mills showing the amounts of the various grades of ore needed, and its distribution throughout the year, is prepared. From this schedule an allotment is made for each mine, based upon its facilities and qualities of ore. The various docks of the Corporation and the steamship lines are furnished with copies of this schedule showing what will be expected of them. The different parts of the system then cooperate in moving the proper quantities of the different grades of ore from the mines all the way to the furnaces at the times specified. When one considers the number of mines shipping ore, the number of mills to which this ore is distributed, the fact that over 200 grades of ore are shipped from the Missabe and Vermillion ranges alone, and the different facilities required for handling the ore, the extent and complexity of this schedule are evident.

The mines of the Steel Corporation at the head of the lakes are owned and operated by the Oliver Iron Mining Company. The

larger mines 15 to 20 shovels may be operated at one time. Ninety-ton shovels with $2\frac{1}{2}$ yd. buckets are generally used. Whenever possible, an idle shovel is kept under steam in each mine so that in case of a break-down of one of the shovels, the reserve shovel may be run in and the trains be kept moving. The average output from a shovel is about seventy-five 50-ton cars in a 10-hour shift, although record runs of 180 cars in the same length of time and 380 cars in two shifts have been reported by individual mines.

Because of the temporary nature of the tracks leading to the shovels it is not ordinarily possible for a loading track to be located so as to have an outlet at both ends. Switches are placed, however, so that the waiting train of empties can be set as near the shovels as possible. The arrangement of tracks from the approach down to the various shovels may consist either of a series of switchbacks, or a continuous grade with loops or circles to keep it within the restricted area of the pit.

A car trimmer at each shovel is responsible for the trimming of the load on each car so that no ore will be lost in transit. This man also tags each car with a card showing the name of the mine and the number of the shovel, and a waybill is made out, giving the grade of the ore, the name of the mine and the



Fig. 3—An Illustration of the Number of Levels in an Open Pit Mine in the Missabe District.

date of shipment, as well as the weight after the car reaches the scales. When the pit trains reach the assembling yard the loads are set in on a track reserved for that particular ore, this being the first step in the classification of the material. A representative of the mining company's testing department takes samples from each car which are tested immediately, and the results of the tests are used in further classifying the ore before it reaches the dock.

The ore cars generally used are of 50 tons capacity with a short wheel base and are of the bottom dump type. Double hopper steel cars are probably in the majority at the present time. The engines used in the pits vary considerably in weight and tractive effort, but a typical locomotive of recent design used by the Oliver Iron Mining Company weighs 124,000 lbs. and has a tractive effort of 28,720 lbs. A number of larger engines weighing 152,000 lbs., with a tractive effort of 33,590 lbs. are also used.

The loaded ore cars in the pits are usually handled in trains of

tribution of empty cars, and also so that the pit boss can be advised of any delay in securing cars which will affect the operation of his mine.

The tracks in an open pit mine are laid and maintained by the mining company, the material being furnished by the railway serving that particular mine. As an example of the magnitude of the track facilities required, there are at present about 37 miles of track in the Hull-Rust mine, the largest on the range. The most common grade for the approach tracks is two per cent., although lighter grades are used wherever possible, and in numerous cases heavier grades have to be adopted. Curves of 15 deg. are usually considered maximum, although 28 deg. curves are not infrequent and one 40 deg. curve is reported.

THE DULUTH, MISSABE & NORTHERN.

The Duluth, Missabe & Northern maintains two principal engine terminals on the range. The output of the mines is such that it is usually able to send an engine out to pick up a com-

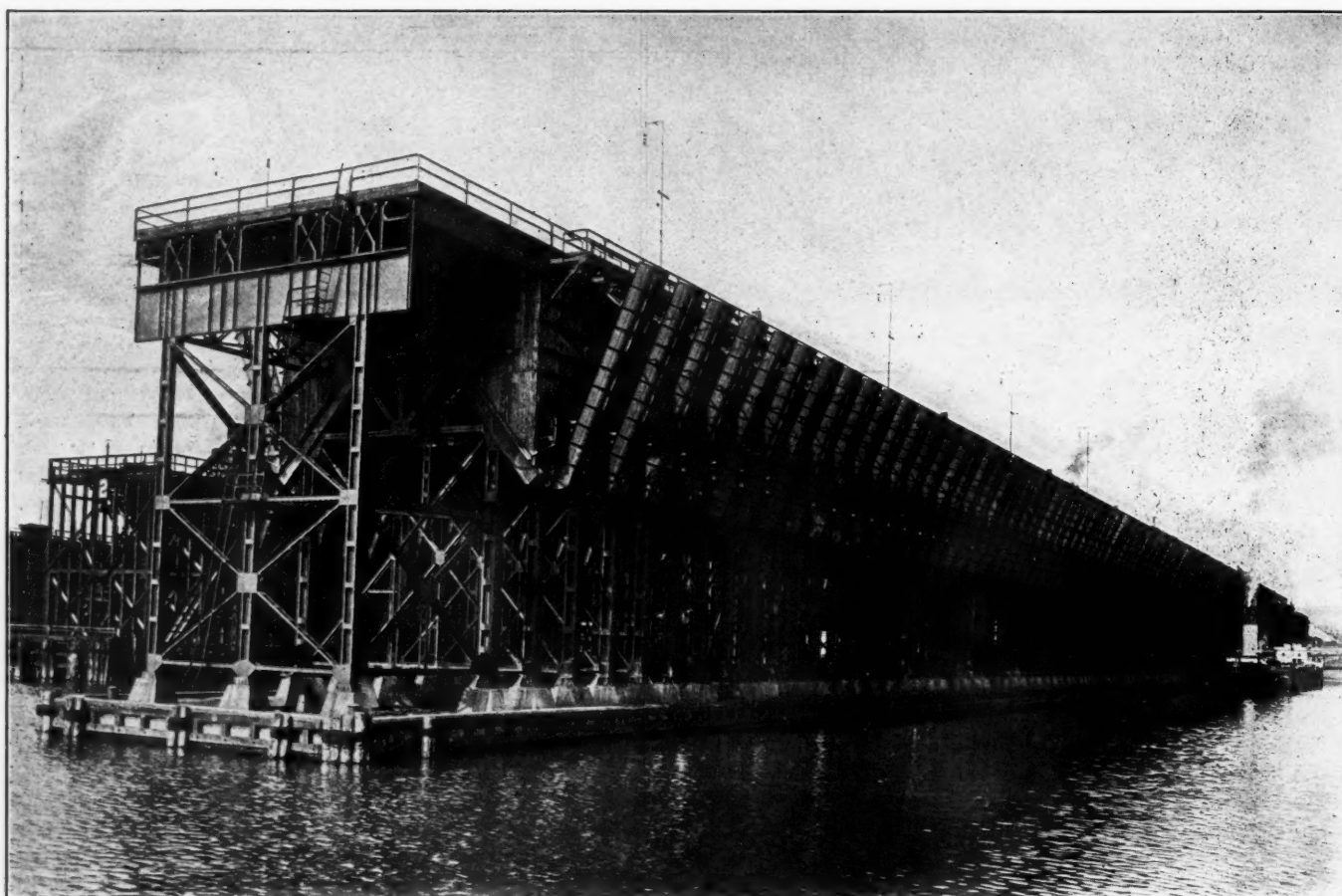


Fig. 4—New Duluth and Iron Range Steel Ore Dock at Two Harbors, Minn.

five, although in some cases 10 cars are handled, depending upon the grades of the approach track. In general it is not considered economical to operate pusher engines in the mines and the pit locomotives are given only the number of cars which they can handle from a shovel to the yard. The number of trains operated in the mine is usually about twice the number of steam shovels working, this ratio varying with the distance between the mine and the yard. These trains are operated under the direction of a pit boss, who usually has a shanty beside the approach track in a position commanding a general view of the mine so that in case of delay at one shovel he can divert the trains of empties to other shovels.

A yardmaster in charge of each yard is responsible for the distribution of empty cars to the mines under his jurisdiction. Telephonic communication is maintained between the offices of the yardmaster and the pit boss so that the former may be informed immediately of any delays to shovels that will influence the dis-

plete train in one mine yard and take it direct to Proctor, a large yard about seven miles from the docks. This line has a maximum grade of 0.3 per cent. against traffic, and two per cent. against empties between Duluth and Proctor, and 0.8 per cent. north of Proctor. Because of this condition, the "hill," as the section between Proctor and the docks is called, is operated as a separate division. The average tonnage per train north of Proctor is about 2,800 net tons, or a gross tonnage of 3,696 tons. It is difficult, however, to load the trains at the mines with very great accuracy because the ore itself varies in weight according to the quality, and the cars are not weighed until they reach Proctor.

Arriving at Proctor these trains are broken up in accordance with instructions received by wire from the mines, based on an analysis of the ore and are made up into trains for movement upon the docks. The tonnage of trains on the "hill" varies in accordance with the amount of ore that is ready to go to the

docks or that is required by the docks, but is always at least equal to the tonnage handled north of Proctor. The run from Proctor to the docks is made in about 45 min., each engine making five round trips in from 10.5 to 12 hours. Mallet locomotives are used for this service, and have proven very economical, as the service requires the development of the full power of the locomotives through the entire run.

About 27 trains of ore were handled daily by the Missabe Railroad in the season of 1910, the gross ore tonnage of 1910 amounting to 13,609,017 tons, and creating a freight traffic dens-

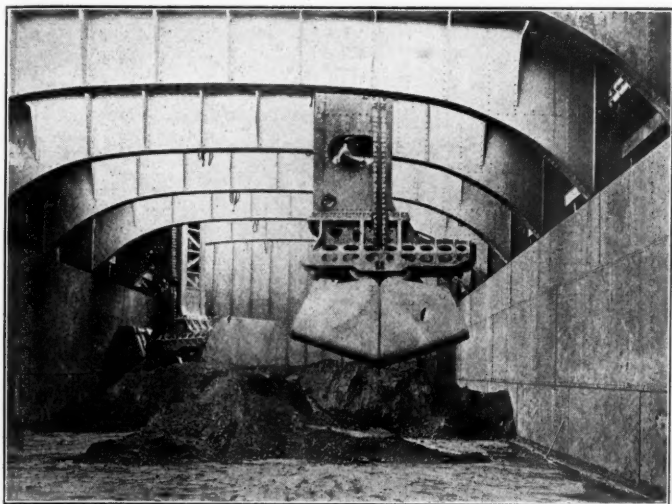


Fig. 5—Interior of Modern Ore Boat, Showing Freedom of Obstructions.

ity in excess of 3,500,000 ton miles per mile of line, in spite of the fact that the northbound movement consists very largely of empty cars returning to the mines, and that the traffic is nearly all handled during the seven months of open season of navigation.

On the Duluth & Iron Range practically the same method of operation is followed except that trains are handled directly from the originating yards to the distributing yards at the docks at Two Harbors. As this line traverses a more hilly country than the Missabe road, its train loading is not as heavy although it has recently added six Mikado locomotives equipped with

superheaters for this service. This road hauled 9,349,000 tons of ore in 1912.

THE UPPER LAKE DOCKS.

Arriving at the lake, the cars are run onto the dock and unloaded by gravity into storage bins, the different grades of ore being unloaded into separate pockets. The mixing of the ore to meet the mill requirements as to grade, as outlined in the season's schedule, is done by unloading required amounts of the different grades into the ore pockets, the actual mixing being secured in the further handling before the material reaches the mills. For the purpose of facilitating transportation, the 200 grades were here combined into 20 groups.

These docks are owned and operated by the railways delivering ore to them. Within the past few years the type and size of dock have materially changed. Three examples of recent steel and concrete structures, including the Duluth & Iron Range dock at Two Harbors, have been described in the *Railway Age Gazette* within the past few months. All of these docks have made excellent records, it being reported that the cost of operation of one of them was less than one-third the cost of an old wooden dock previously used. Special features in the design of these docks are the self-cleaning of the bins, the adoption of electric hoists for handling the spouts, and the arrangement of the spouts whereby the ore may be distributed in the boat so as to require the minimum of trimming and the practical elimination of all hand labor in transferring the ore from the cars through the dock to the vessel. These docks contain from 110 to 200 pockets on each side, each pocket containing 150 to 300 tons of ore. From four to six boats can be loaded at one time. As an example of the amount of ore which can be loaded into a vessel, 9,500 tons of ore were loaded into one vessel in 25 min. shortly after the completion of the Great Northern dock, and at another time eight vessels with an aggregate tonnage of 62,000 tons, were loaded in six hours, an average rate of 10,333 tons per hour.

THE STEAMSHIP LINE.

The Pittsburgh Steamship Company operates between the Lake Superior docks and Lake Erie and South Chicago ports with 79 steamers and 21 barges in this service, the newer vessels being of all-steel construction, 600 ft. long by 58 ft. wide, and free of interior obstructions, as shown in one of the photographs. These boats will carry 11,000 tons of ore with a 19 ft. stage of water at the Soo Canal, this being the critical point. The distance from Duluth to South Chicago is 817 miles and to Cleveland 834 miles,

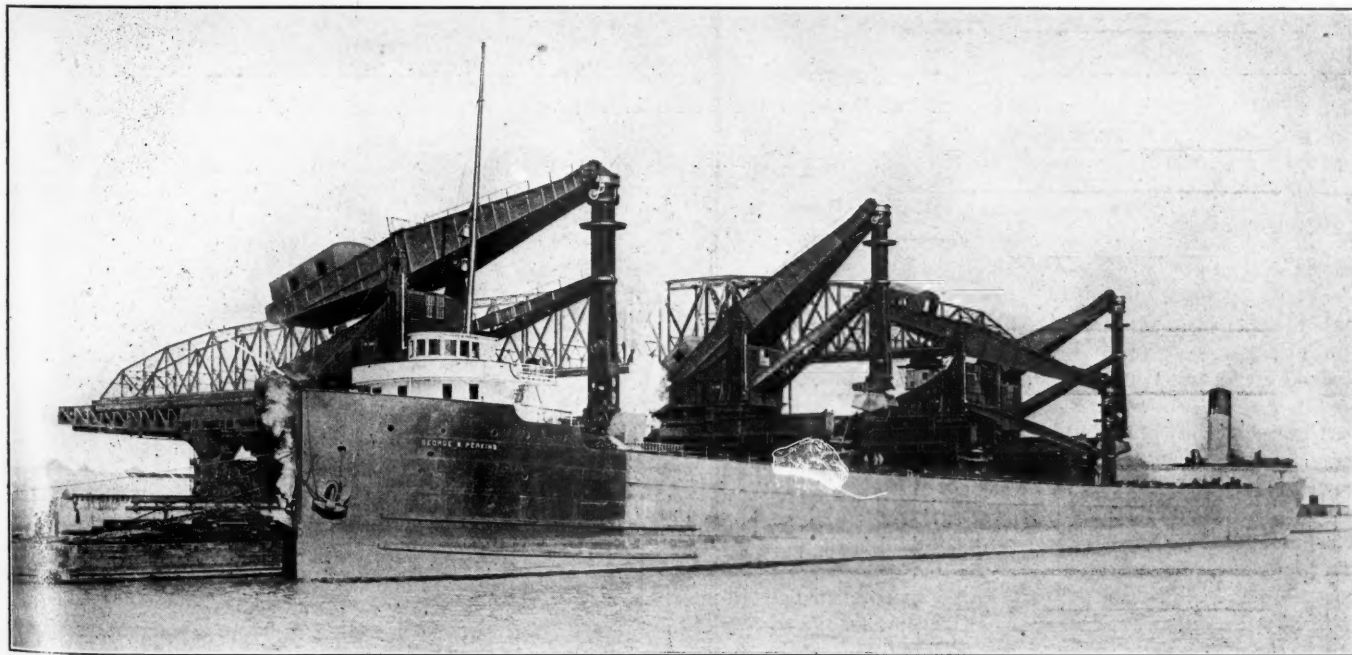


Fig. 6—Hulett Unloaders with 15 ton Buckets at Work on Conneaut Dock.

requiring about $3\frac{1}{2}$ days each way. The average detention at the head of the lakes for loading and other delays is 15 hours, and for unloading at the lower lake ports is 27 hours. The average season of navigation is about 200 days. Last year the fleet made 21 round trips.

These boats carry only Corporation ore southbound and are then able to move only about 60 per cent. of the tonnage, the balance being handled in vessels chartered by the season or trip. About 14,600,000 tons of ore were moved by boats of the Pittsburgh Steamship Company last year, and about 1,200,000 tons of coal, largely for company use, was handled northbound. No attempt is made to secure traffic northbound, as the first aim is to maintain a regular service for the Corporation. However, whenever there is a shortage of other boats for northbound movement, as frequently happens at the beginning and end of the season, these boats are loaded northbound at the solicitation of the shippers. This northbound coal movement on the lakes is increasing rapidly. In 1902 27,039,000 tons of ore moved over the lakes, while in 1912 this had risen to 47,435,000 tons, while the coal business increased from 8,359,000 tons in 1902 to 23,335,000 tons

the ends of their trips, and are also supplied by a commissary boat which moves through the locks at the Soo with them in order to save delays. In addition to the ore service, boats are maintained in regular service hauling limestone from Calcite, Mich., to South Chicago and Gary, about 200,000 tons being hauled last year.

THE CONNEAUT DOCK.

Of the 37,465,853 tons of ore unloaded at Lake Erie ports last year, 7,839,831 tons were handled at Conneaut. This was brought in in 1,009 vessels, 492 of which belonged to the Pittsburgh Steamship Company, and 517 to independent owners, the average cargo of 7,770 tons being 10 per cent. under the average loading because of low water at the Soo. The increase in the amount of ore handled at this port, as well as in the capacity of the vessels, is strikingly shown by the fact that in 1893, the first year when these docks were operated to any extent, 100 vessels brought 203,207 tons of ore.

About 20 per cent. of the ore received here is stored for movement to Pittsburgh during the winter, while the remainder

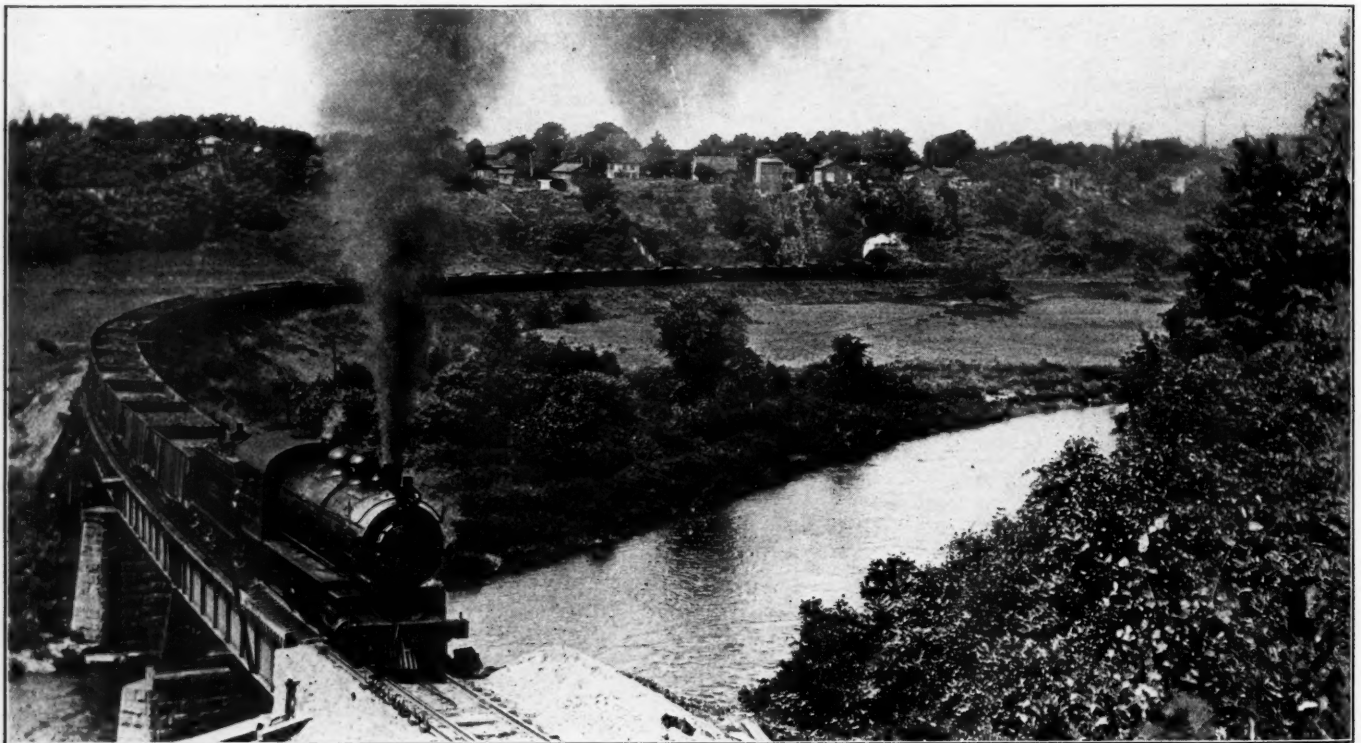


Fig. 7—Typical Ore Train of the Bessemer Road Leaving Conneaut Harbor.

in 1912. As the above figures show, the coal business is handled almost entirely by private boats.

The number of boats on the lakes has usually been in excess of the demand. For this reason the rate net to the boats on ore from upper to lower lake ports has gradually decreased from \$0.61 in 1901 to \$0.40 in 1912, although because of the prospect of large shipments this season the rate returned this spring to \$0.45. This rate fluctuates with the condition of the ore business, and the supply of boats and is fixed by season charters.

The boats of the Steel Corporation are not placed in service between certain definite ports, but are moved from port to port as conditions demand. All boats loaded for Lake Michigan ports are despatched to South Chicago, and may then be ordered to Gary if the ore is desired at that point. Boats loaded for Lake Erie ports are despatched to Cleveland and receive definite instructions regarding destination at Detroit. All despatching of boats is handled from Cleveland, this despatching being determined by the original schedule of ore movements, the quality of ore in the cargo, the car supply at the docks, the supply of ore at the furnace, etc. The boats are loaded and unloaded in turn at the various docks. They are given the necessary supplies at

is unloaded from the boats directly onto cars. The ore is unloaded by machines, mainly of the Hulett and Brown types, there being nine new machines and 25 old ones on this dock. The new machines will handle from 10 to 15 tons at each operation. In placing cars under the unloaders a plan first adopted at Conneaut, and since installed at a number of other docks, was the construction of a loop back of the machines on which cars were placed by a switch engine. From this point the cars are drawn under the unloader by cables, in this way giving a continuous movement and eliminating the delays to the machines which would otherwise be necessary while switching cars.

Of special interest to the railway man is the fact that the cars leave the dock with an average of 97 per cent. of their maximum load, including 10 per cent. overload. The new 15-ton Hulett Electric unloading machine is equipped with a weighing device.

On other machines an estimator is located at each machine who gages the amount loaded on each car. After leaving the machines these cars pass over the scales and if not properly loaded, to a trimming machine, which either adds or removes ore sufficient to bring the car within the limits of loading, in this way securing the maximum service out of the cars. The only

classification of cars before loading is to separate the hopper bottom cars from the gondolas to facilitate unloading at the mills.

As an indication of the amount of ore which may be handled, on August 12, 1912, the nine new machines unloaded 10,636 tons of ore from one boat between 2:20 and 5:10 p. m., which after deducting delays, was at the rate of 4,137 tons per hour. On May 20, 1912, 1,186 cars, or 55,230 tons were loaded from the dock and vessel, while on August 19, 1911, 1,202 cars, or 55,432 tons, were loaded in 20 hours. At another time these machines unloaded 101,054 tons, of ore from 10 boats in 42 hours and 45 minutes, or an average of 2,364 tons per hour. A boat ordinarily contains but one quality of ore, although under certain conditions two or three grades may be loaded in one cargo.

With the exception of that destined to Clairton and McKeesport, all ore is billed simply to North Bessemer and is distributed from there on orders from the general offices. A card showing the number of the car, the name of the vessel, the date loaded and the grade of the ore, is placed on each car as it is loaded and a duplicate slip is given the weighmaster. A car cannot be moved unless it is carded, and the conductors are required to check their waybills with these cards before starting their trains. As a train of ore leaves Albion the offices of the Steel Corporation in Pittsburgh are advised by wire of the movement of the cars and of the kind of ore on them.

In addition to the ore this dock loads a large amount of coal, rails, brick, cement and miscellaneous material northbound on Corporation and outside boats. One collier is in regular service across Lake Erie to Rondeau, Ont., making a regular trip every two and one-half days, while a car ferry with a capacity of 30 cars operates to Port Stanley, Ont., twice daily. The collier is provided with tracks on its deck, is loaded from drop bottom cars and carries a cargo of 2,500 tons of coal in the hold. In case coal for collier shipment is received in gondola cars the transfer from the cars to the collier is made by means of a car dumper, the "kickup" at this dumper operating with the loads rather than with the empties as is the usual practice. A new modern car dumper will be installed this year, increasing the capacity at the dock for coal shipments up the lakes and reducing vessel delays on lake shipments. Ten engines and 24 crews are required on the dock and in the assembling yard.

THE BESSEMER & LAKE ERIE.

The most interesting portion of this entire system from the transportation standpoint is the Bessemer & Lake Erie Railroad. Built originally between Conneaut Harbor, Ohio, and Butler, Pa., a controlling interest in it was obtained by the Carnegie Steel Company in 1896, and the line was extended 42 miles, from Butler to Bessemer, giving it access to the Carnegie Steel Company works at Braddock, Homestead and Duquesne through the Union Railroad. The through line was opened for business in the fall of 1897. The total tonnage handled by it in 1897 was 1,151,356 tons, of which 500,328 tons was ore, and 650,928 tons other freight. This road now carries more than that tonnage monthly during the navigation season. The distance from Conneaut Harbor, O., to North Bessemer, Pa., is 142 miles. Topographically it has the least favorable location of any of the large ore carrying roads between Lake Erie and Pittsburgh, crossing eight water sheds.

It is operated from the dock to Albion, a distance of 16 miles, with heavy drag engines of the consolidation type weighing 391,000 lbs., with 225,000 lbs., on the drivers, hauling 2,550 tons up the 1.1 per cent. grade with the assistance of a pusher engine for the first two and one-half miles. From Albion to North Bessemer, 126 miles, trains of 2,100 tons are hauled by consolidation engines weighing 336,000 lbs. with 180,000 lbs. on the drivers. The ruling grade southbound is 0.6 per cent. and northbound 0.75 per cent. A pusher engine assists southbound trains over a district of seven miles from Conneautville south, and trains are double-headed for 90 miles into North Bessemer in order to provide power for northbound movements. This arrangement also permits southbound tonnage trains to pick up six cars of

limestone each in the vicinity of Butler for the mills, 100 cars of this material being moved in this way daily without any increase in train mileage.

A study of the Bessemer is very interesting from the traffic standpoint. The main traffic is, of course, ore southbound, while coal, finished steel products and miscellaneous traffic are moved northbound. The ore traffic has increased from 3,662,417 tons in 1901 to 8,578,930 in 1912. In the same period coal traffic northbound has been developed from in the neighborhood of 1,000,000 tons to 3,782,621 tons, and miscellaneous traffic from 1,761,781 to 3,017,871 tons, the coal moving mainly up the lakes and across Lake Erie to Canada by ferry and collier, while finished steel and miscellaneous products are turned over to the Erie, Lake Shore, Nickel Plate and Buffalo, Rochester & Pittsburgh roads for various destinations. Thus, while the ore traffic southbound has increased 135 per cent. in 11 years, the percentage of all traffic moving northbound has risen from 25.2 per cent. to 34.8 per cent. This northbound traffic has practically all been developed by the road, and with the further development of coal properties now under way it is expected that the northbound traffic will equal, if not exceed, the southbound traffic within two or three years. It is also interesting to note that the traffic density in ton miles per mile of line has increased from 3,375,719 in 1901 to 8,940,080 in

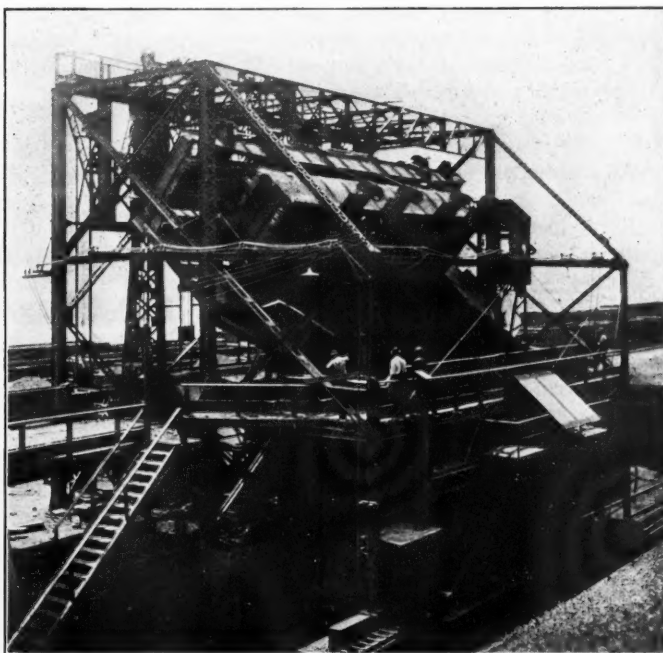


Fig. 8—Car Dumper Unloading a Gondola Car at the Mill.

1912, this latter figure being exceeded by only one road in this country, the Pittsburgh & Lake Erie. This latter road has four tracks over a large portion of its lines, while the Bessemer has only two tracks, with three stretches of single track amounting in all to 11.5 miles. In connection with this unusually high freight density the passenger train revenue per mile of line for 1912 was \$2,028.68, all of which is derived from distinctly local traffic.

Although the rate for the transportation of ore is the same from all lake ports to Pittsburgh, the operating ratio of the Bessemer for last year was 54.92, which is again unusual, and is the result of several conditions. In the first place, the average number of revenue tons per train for 1912 was 1,038 and per loaded car, 43.53, while improvements now under way near the southern end of this line will materially raise the train tonnage. At the present time the Bessemer is required to dispose of 125 cars of waste material from the mills daily, in winter as well as in summer. This material is being utilized to remove sags at a comparatively small expenditure, and upon the completion of this work the mileage of assistant engines will be materially reduced.

Another point in which this road stands out conspicuously is

in the absolute uniformity in the movement of the trains over the lines from Albion to North Bessemer. During the season of navigation ore trains leave Albion every hour and move over the 126 miles to North Bessemer in an average time of 12 hours and 20 minutes, this monthly average not varying over five minutes from month to month throughout the year. As a result, trains are never tied up under the 16-hour law, and there is practically no overtime for train crews. This condition is brought about by several causes. In the first place, the engines are not overloaded, but are given such tonnage as they can move over the line readily. In the second place, there is no terminal delay, engines and cars being placed in the trains and the waybills checked with the train before the crew takes charge. The trains are thus enabled to leave the terminal at the time for which the crews are called, the average delay being less than seven minutes per train. This in itself assists in preventing the application of the 16-hour law, for the entire time of the crew is spent on the road. Also, three dispatchers' districts are provided for the 225 miles of line, all of which is equipped with telephone and manual block. The dispatchers are thus enabled to keep ahead of their work all the time and train movements are anticipated. Another cause contributing to this result is the staff of trainmasters. Two general trainmasters are provided in charge of the office and outside work, respectively. In addition to this, two assistant trainmasters, each in charge of a certain portion of the line, and two road foremen of engines spend practically their entire time riding trains and supervising their movement.

THE UNION RAILROAD.

At North Bessemer the traffic for the furnaces and steel mills of the Corporation is turned over to the Union Railroad for delivery to the mills and industries or to connecting lines. The mills are advised daily of the shipment of Corporation ore from Conneaut, and of its receipt at North Bessemer, and they in turn advise the superintendent of the Union Railroad each morning and evening of the amount of ore of the different qualities which they will require for the following 12 hours for mill consumption and for winter storage, for the mills endeavor to accumulate as large storage piles as space will permit during the summer to avoid shipping frozen ore during the winter. Acting upon these advices, the specified amounts of ore of the different grades are distributed to the various mills by the Union Railroad, the ore being delivered by grade only, as shown by the cards on the cars, these cards following the ore into the mill even if it is transferred from one car to another en route. In this way switching is reduced to a minimum, while the mills get the ore they desire.

Arriving at the mills the cars are in general emptied by car dumpers and the ore is transferred either onto stock piles or into bunkers for charging the furnaces. At one of the older mills, however, these bunkers are filled from a trestle from hopper bottom cars, although it occasionally becomes necessary to run gondolas over the bunkers and unload them by a clam shell or by hand if no hopper cars with the proper grade of ore can be secured. This, however, is the exception, and occurs at only the one mill.

The yards at each mill are under the direct charge of a general superintendent of transportation, who has supervision over the movement of cars after delivery to the mill by the Union Railroad. As an example of the amount of traffic handled, an average day's receipts at the Edgar Thomson mill is 16,000 tons of ore, 2,400 tons of limestone and 4,800 tons of coke. During May of this year, 38,000 cars were moved in and out of this mill, while 50,000 cars are handled monthly at the Homestead works. The Homestead plant contains about 200 miles of track and requires 33 switch engines for its operation. About 200 cars of finished material are shipped out of this plant daily, practically all of which is loaded in gondolas which have brought ore inbound.

The various units in the general transportation system are each under the direct charge of a local officer as president or vice-

president, who devotes his entire time to the one unit. General supervision of the entire system is concentrated under the direction of D. G. Kerr, vice-president of the United States Steel Corporation, who directs the operation of the various units to insure their full co-operation, as outlined above.

THE RAILWAY BUSINESS ASSOCIATION ON RAILWAY INCOMES.

The Railway Business Association has issued bulletin No. 14, which is divided into two parts, one entitled "Railway Income Still Under 1910," and the other entitled "Making Equipment Carry All It Can." The second part contains a large amount of information regarding the car situation and means by which the efficiency of the use of cars can be increased. Among other matters there is a short statement by Chairman Clark of the Interstate Commerce Commission, resolutions adopted by the National Industrial Traffic League, urging shippers and railroads to co-operate to increase the movement of cars, and a short article by President Kruttschnitt of the American Railway Association along the same general lines. The discussion regarding railway income is as follows:

"Current monthly reports of railway revenue and expenses, if studied in the light of the 1910 experience, will afford business bodies important guidance in adopting an attitude toward the proposed advances in eastern freight rates.

"The Interstate Commerce Commission two years ago expressed the hope that the roads would increase their income without any advance in rates, and accordingly denied the advance. Since then complete statistics have been published for 1910, 1911 and 1912.

"Operating revenue was 1.4 per cent. larger in 1911 than in 1910, and 2 per cent. larger in 1912 than in 1911, yet net corporate income, available for improvements, dividends and surplus, was under the 1910 record by 20 per cent. in 1911 and under the 1910 record by 15 per cent. in 1912.

"This decline in net corporate income despite higher operating revenues was due to the rise in costs: (1) rail operating expenses, (2) taxes and (3) the debit which arises from balancing non-operating receipts against non-operating expenses, chiefly interest.

"Weakened selling power of railway securities as compared with corporations which can raise their prices and hence can offer a higher return on new issues has put beyond doubt the insufficiency of railway income in past years. A previous bulletin demonstrated that new capital issues of steam railways listed on the New York Stock Exchange were in 1912 the smallest in ten years, while new issues listed by non-railroad corporations were the largest of the decade. Those who think that the trouble is over-capitalization should read an article on that subject in the *Saturday Evening Post* for August 9, 1913, by Alba B. Johnson, in which it is demonstrated that American railways are capitalized so low compared with foreign lines as to raise the question whether any difference in conditions could offset the discrepancy in our favor. The practical condition of declining railway credit is not disputed.

"Nor should superficial impressions derived from preliminary monthly reports give the public a false confidence in better results for the future on the present level of freight rates. Some business men have asked whether the earnings of 1913 do not meet the situation and render an advance in rates unnecessary. For their benefit and that of others who may share that impression it seems desirable to demonstrate in detail that the preliminary figures now available contain no basis for any prediction whatever.

"For eleven months of 1913 bulletins of the Bureau of Railway Economics are out, compiled from the commission's returns. An inexperienced observer jumping at conclusions may find, or think he has found, that operating income (operating revenue

less operating expenses less taxes), amounting to \$3,396 per mile of line, is substantially greater than one or another figure for eleven months of some previous year. From this he might confidently predict that as a result of the operations of 1913 the railway system has realized the increased 'income' prophesied two years ago.

"As a matter of fact these preliminary returns will not bear any such interpretation; for operating income has still to be scaled down by large deductions not yet reported, and estimates computed upon actual deductions used in obtaining final figures in previous years tend to show that net corporate income in 1913 did not rise to the level of 1910.

"Disclaiming prophetic gift and going through some imaginary computations merely to show the unsafeness of current monthly reports as a basis for forecasts, let us endeavor to chart the route which anyone attempting such predictions would have to travel before he could offer reasonable ground even for a guess as to future railway income or even income for the fiscal year just closed.

"Our prophet starts out with an operating income of \$3,396 per mile for eleven months for the roads included. Here are some deductions to which his figure is subject:

"(1) The roads included in that report are those having a million dollars or more operating revenue. These are the more prosperous roads. When the poorer lines are averaged in for the ultimate statistics of the commission, this amount per mile of line is pulled down. For instance, the Bureau of Railway Economics in May, 1911, reported for the large roads operating income per mile of line as \$3,058 for eleven months. The ultimate figure for all roads proved to be \$163 less, or a shrinkage of 5.3 per cent. There is nothing to assure us that the shrinkage will be smaller in the year 1913 than it was in the year 1911.

"Suppose shrinkage in operating income from preliminary to final figures shall be at the same rate as in 1911, or 5.3 per cent.; our \$3,396 would become \$3,216.

"(2) Nobody knows how many miles of line will be included in the ultimate statistics for 1913. The average annual increase in mileage operated from 1908 to 1912 was 2.09 per cent. If this happened to be the precise rate of increase in 1913 the mileage operated would be 255,611.13. If the mileage omitted from the income account should be in the same proportion to the total mileage operated as in 1910, or 1.6 per cent., the mileage to be considered would be 251,521.36. Operating income at \$3,216 per mile would be \$808,892,693.76, or an increase over 11 months of 1910 of 5.5 per cent.

"(3) We next proceed to estimate sums deducted from revenue after payment of operating expenses and taxes.

"The biggest item in such deductions is interest on funded debt. The 1913 plant is not the same plant as that of 1910. New investment has been made in it. Nobody knows how many miles of track there are. If they increased in 1912 and in 1913 at exactly the same rate as in 1911, or 3.1 per cent., there were 33,901 more miles of track in 1913 than in 1910, or an increase of 9.6 per cent. Aggregate tractive power of locomotives in 1913 may not be published for a year or two yet. One man's guess is as good as another's. But if it rose in 1912 and 1913 at just the annual rate of 1911, or 5.8 per cent., then drawing power of locomotives was 293,311,501 lbs. greater in 1913 than in 1910, or 18.5 per cent. All we have concerning enlargement of freight car capacity since 1911 is the unofficial information that the calendar year 1912 saw a larger number of freight cars built than the twelve-month preceding. Suppose this form of additions rose in 1912 and 1913 at the identical rate of 1911, or 5.8 per cent.; then in 1913 there were 14,175,970 more tons of freight car capacity than in 1910, or 18.5 per cent.

"This investment in track and rolling stock, to say nothing of steel passenger cars substituted for wooden, safety devices installed, grade crossings eliminated, roadbed and bridges rebuilt, grades and curves corrected, terminals improved and extended,

have created new charges against income, a large part being obligatory interest on funded debt.

"How much is the increase in fixed charges? It will take two years or so to find out.

"To ascertain at that distant date net corporate income available for improvements, dividends and surplus, we shall have to deduct from operating income the difference between non-operating income and non-operating expenses—always a debit. If such deductions progressed in 1912 and in 1913 at the average annual rate in 1909, 1910 and 1911, or an increase of 6.93 per cent., they reached in eleven months of 1913, \$347,036,845. This conjectural net deduction from our estimated operating income, \$808,892,693.76, would leave \$461,855,848.76 as the net corporate income available for improvements, dividends and surplus. That item in 1910 for eleven months was \$473,545,160.

"Our prophesied increase of income, if past averages hold good, has shrunk in 1913 to a loss under 1910 of \$11,689,312, or 2.47 per cent., and this with a plant in 1913 estimated to have 33,901 more miles of track than the plant of 1910, 293,311,501 more pounds of locomotive tractive power and 14,175,970 more tons of freight car capacity, and to have carried 7,900 million more tons of freight one mile.

"We have endeavored to lead over his course in imagination the prophet who bases predictions of increased income upon current reports of operating revenue, operating expenses and taxes. Without traversing the course in reality the facts cannot be ascertained as to the ultimate result of railway operations for the fiscal year 1913. The conjectural estimates indulged in have an infinitely sounder basis in past experience than to repeat in 1913 for the year 1914 and following those forecasts made in 1910 which grim facts have since so completely disappointed.

"Prominent business organizations in St. Louis, Cincinnati, Pittsburgh, Philadelphia, Baltimore and other large cities have adopted resolutions favoring, or deciding not to oppose, higher freight rates where under the eastern roads may provide better service. Other bodies have the matter under consideration. It is of national importance that shippers and trade associations avoid preliminary returns as a clue to the complete income account and avoid estimating future income on the basis of earnings in the single year in which the rate case is heard. The resources of a railway during a period of years are the sum of poor years and good alike, not the product of the best year multiplied by the number of years. Action should be based upon the known past, not upon the half revealed present.

"The veteran merchant, E. C. Simmons, said in an article in *Leslie's Weekly* for June 5: 'Thousands of shippers all over the land have come to realize the fact that their business is prosperous only when the railroads are prosperous and that any slight increase in freight rates which they might have to pay would soon be lost sight of in the enormous increase in the profits of their business which this general prosperity would bring about.'

"Hardly any national calamity could be more exasperating than industrial prostration descending in the midst of busy times, with order books full and mills running to capacity—prostration brought about by congestion of terminals, throwing into idleness, with their employees, factories which could neither obtain raw material nor deliver finished product, while food stuffs lay rotting in cars and elevators.

"The public had better be safe than sorry—assured of good service rather than in danger of a transportation breakdown."

RAILWAYS IN GERMAN EAST AFRICA.—The German Colonial Office is at present negotiating with a group of banks in the capital for a loan of about \$12,500,000, which is required for the further construction of the Central Railway across German East Africa to Lake Tanganyika and to finance a land mortgage bank in South-West Africa.

REPORT ON TYRONE COLLISION.

The Interstate Commerce Commission issued, September 9, a report, dated August 19, and signed by H. W. Belnap, chief inspector of safety appliances, on the rear collision of passenger trains which occurred at Tyrone, Pa., on the middle division of the Pennsylvania Railroad July 30 last.

This accident was reported in the *Railway Age Gazette* of

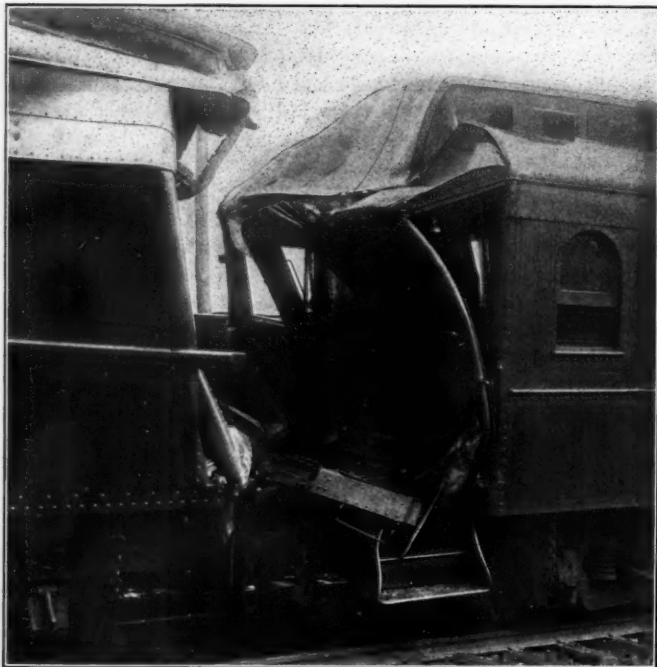


Fig. 1—Dining Car and Coach, Second and Third from Rear of No. 15.

August 22, page 329. The government report gives some additional details concerning the cause. The leading train had been standing at the station about five minutes. The rear brakeman, after assisting passengers to get off and on, started back with his red flag, but he had only gone 500 ft. when he was called in. He had not gone beyond the end of the station platform, and so did not put down torpedoes, as the use of torpedoes opposite a station platform is forbidden. The following train, No. 13, passed distant and home automatic block signals

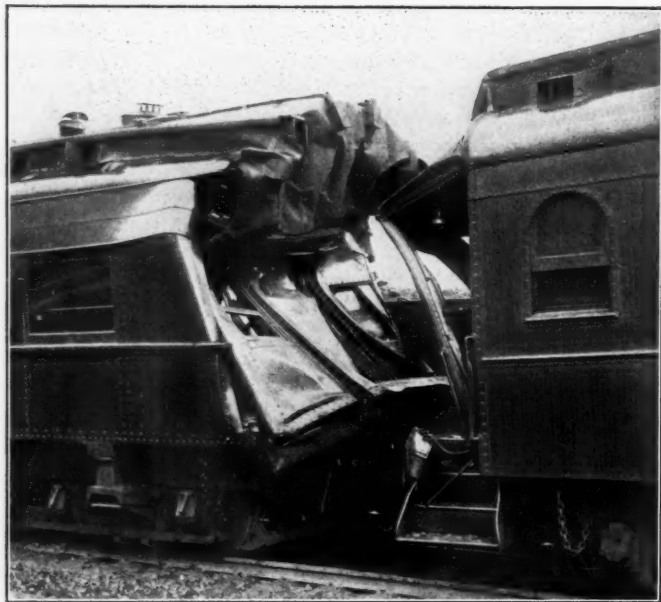


Fig. 2—Dining Car and Parlor Car (Parlor Car Last in Train).

set against it; and the inspector believes that probably a clear distant signal for track No. 4, on the same bridge, was mistaken for the signal for track No. 3, on which the train was running. An assistant road foreman of engines was on the engine and he and the fireman are censured also. (The engineman was killed.) The foreman is censured for calling out the signal, when he approached it, instead of leaving the engineman and fireman to perform their functions themselves, his duty being not to aid them, but to see that they themselves performed their duties properly. When they came to the home signal all of the three men recognized that it was against them; the foreman was the first to see it and he shouted to the engineman; and the inspector believes that if the emergency brakes had been applied at that moment the collision would have been averted or greatly mitigated.

The shock of the collision was largely absorbed by the crushing of the platforms and vestibules of the cars, all the cars in the leading train being of steel. The rear car, however, was partly crushed. The engineman was the only person killed. The

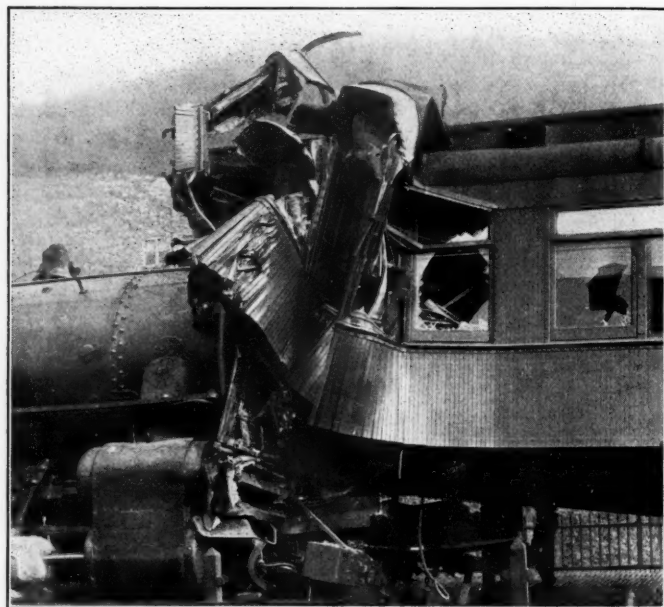


Fig. 3—Engine and Parlor Car.

inspector says that the flagman should not assist in loading and unloading passengers, but he is not censured, the rule requiring that a flagman go back immediately applying only at places other than stations. Had the rules required the flagman to be stationed at the rear end of the train, and at regular stops of more than one minute duration to go back, he could in this case have gone back beyond the home signal; and if he had done so and had put down torpedoes, it is the opinion of the inspector that the collision would have been averted.

Three illustrations, accompanying the report, and showing the effect of the collision on some of the steel cars, are reproduced herewith.

LABORATORY OF THE SOUTH MANCHURIA RAILWAY.—The South Manchuria Railway plans to expend the following in its experimental enterprises operated in connection with the central laboratory of the railway: Construction and equipment of building for weaving pongee silk, and brewing and distilling liquors from local products, \$60,000; pottery enlargement, \$10,000; new experimental bean-oil mill, \$115,000; enlarging main laboratory, \$100,000. To these expenditures the cost of machinery to be installed by the South Manchuria Railway, will bring the total to about \$400,000. Some of this construction work will be begun during the year 1913, and the remainder next spring.

MASTER PAINTERS' ASSOCIATION.

Important Reports on Finishing Steel Passenger Train Cars, Paint Protection for Steel Equipment and Paint Tests.

The forty-fourth annual convention of the Master Car and Locomotive Painters' Association was held in Ottawa, Canada, September 9 to 12, as noted in the *Railway Age Gazette* of September 12, on page 472. The following is a report of the convention:

PRESIDENT'S ADDRESS.

President A. J. Bush in his address spoke of the successful work of the various committees, especially that of the information and test committee. Both these committees have given the association some very valuable information, and it is hoped that more of the members will make greater use of the information committee. He exhorted the members to participate freely in the discussion and to do everything in their power to make the work of the association a material success.

FINISHING STEEL PASSENGER CARS.

Two papers were presented on this subject, one by John Gearhart (Penna.), and another by H. M. Butts (N. Y. C.). Mr. Gearhart described the baking process by means of a large oven which the Pennsylvania have placed in service at Altoona, Pa. This oven is large enough to accommodate the largest car on that road, being 90 ft. 3 in. long, 13 ft. wide and 15 ft. high. This oven is heated by steam coils, having a total surface of 2,741 sq. ft.; the ratio of heating surface to cubical contents being one to six. This oven has been heated to as high as 305 deg. It is believed that the temperature can be raised to the desired degree in from 2½ or 2 hours without affecting the durability of the paint. With this oven it is possible to paint two cars complete in 6½ days, the saving in time on new cars being between 7 and 10 days over that of the air-drying system. The advantages of the baking process are that the cars may be finished on schedule time, the temperature and weather conditions can be more carefully regulated and there is no interference by workmen of the other trades while the paint is drying. Two 54-ft. passenger cars, four 78-ft. dining cars, six 70-ft. baggage and mail cars, four passenger locomotive tenders, and 20 steel hopper cars have been baked in the oven at Altoona, and 1,000 steel freight cars are to be baked at the oven at South Amboy, N. J., next month. Experiments are being made with non- and semi-drying oils on freight cars. Japans or other artificial driers are not used in this baking process.

H. M. Butts (N. Y. C.): The baking process is attracting more attention at present than any other. The baking of paint and varnish mixtures is not new, but has long been in common use. However, as applied to passenger cars, it is comparatively new, and largely in the experimental stage. The various formulas are very imperfect and cannot be relied on as giving the proper proportion of material which can be safely used in mixing the various colors for the baking process. One eminent authority, J. W. Lawler, chief chemist of the Pullman Company, says that results and experience based on practical tests show that the life of a baked paint on steel is greatly prolonged, its adherent qualities are increased and it has the additional value of being much more impervious to moisture and gas than the same vehicle unbaked.

Allowing this statement to be correct, has it been fully determined whether its life has been really and wonderfully improved? From time immemorial it has been a commonly accepted fact that slow-drying and more elastic vehicles will resist moisture and severe atmospheric changes for a much longer time than a quick, hard drying one, also that very soon after a vehicle loses its elasticity, decomposition sets in and complete disintegration is very near at hand. Immediately after baking, a vehicle becomes hard and brittle, which justifies the assumption, does not baking hasten its destruction? A sufficient ex-

posure or service test can only satisfactorily answer this question. Whether the baking of paint on passenger cars will ever become an economical proposition is very much in doubt, as the mechanical difficulties of baking an entire car are very great. The time required for cooling off the hot metal before a subsequent coat can be applied with safety is something that must be considered.

Baking the interior separate from the outside is being tried with considerable success by the Hudson & Manhattan of New York City. Electric heaters are suspended from the ceiling which furnish the heat, the windows and doors being closed tight, thus enabling a proper amount of heat to be generated to accomplish the baking.

The prevention of corrosion of the metal seems to be the most difficult problem which confronts us. Numerous mixtures claiming to prevent corrosion are on the market. There is no reliable evidence at hand which proves that any of them can be safely used for painting passenger cars. Most of the so-called rust preventatives are only suitable for use on structural steel, such as is used on bridges and buildings.

The New York Central has not made any very radical changes in the paint specifications; with the one exception, that of using the same priming coat for both wood and metal. We have in service about 200 steel passenger cars which were painted about 7 years ago with one of the surfacing systems, well known to us all, which are making a very excellent showing. The surface of these cars was first thoroughly sandblasted, then primed and surfaced in the good old-fashioned way.

DISCUSSION.

H. M. Butts (N. Y. C.): If a paint can be dried artificially without the use of a liquid drier its life and durability will be increased and this feature alone would make the baking process worth while.

John Gearhart (Penna.): The surfacers used have been prepared in our own laboratories. We have been experimenting with six or eight different varnishes. Some we find will bake better than others; some became flat after rubbing, while others looked the same as if they were air-dried. The cars baked last February are in much better condition at the present time than those that were air dried. Baked dining cars running in the tunnels at Washington, D. C., appear to be in the same condition after the eighth cleaning as the air-dried cars after their fifth cleaning. The air-dried finish on the car does not behave like those on the test panels, the test panels being much shorter lived than the cars. The baking process is practical and looks economical, but it will be a year or so before definite information can be obtained.

J. H. Pitard (M. & O.): Our traveling inspector found a loaded steel freight car broken in the middle, due to rust. While this is an exceptional case, it shows what rust will do if a steel car is neglected.

TEST COMMITTEE'S REPORT.

Oscar P. Wilkins (N. & W.), chairman of the test committee, read the following report:

In order to determine the actual relative value of paint stock it is necessary to make service tests under normal conditions, but as it requires long periods of time to accomplish satisfactory results, we find in the test panels a good medium for making comparative tests. Accelerated tests under abnormally severe conditions are misleading unless the results obtained by the method selected will be in harmony with long time service tests. Therefore in making a panel test we should adhere closely to the line of actual practice in preparing the panel, and the exposure should be consistent with that of actual service.

The test panels of varnish exposed for 12 months beginning July, 1912, and which were referred to in the last year's report, were prepared in accordance with these views. We consider the test an accelerated one, but one that indicates the comparative value of the varnish samples involved. The samples were secured from various master painters who are members of this association, and were taken from the regular purchased stock. The wood panels, 14 in number, and 5 ft. long, were cut from the same piece. They were finished with the same priming, surfacing and coloring materials in exactly the same manner as a new wooden passenger coach. Three coats of varnish were applied to each panel, 48 hours being allowed between the coats for drying. All operations were performed by the same man, and as near the same time as possible. The panels were allowed to stand one week after the last coat of varnish had been applied for hardening. They were then sawed into 1-ft. lengths and a panel of each sample sent to H. M. Butts, Albany, N. Y.; J. H. Pitard, Whistler, Ala.; T. J. Hutchinson, London, Ont.; A. P. Dane, Reading, Mass.,* and one set was retained at Roanoke, Va.

An examination of the test panels showed that the southern climate is the most severe on varnished surfaces; that there is a difference between all the samples tested; also a difference between the results obtained on the same varnish at different points.

One of the most noticeable features of the test is the generally superior condition of panels exposed in the North over those exposed in the South. The test furnishes a good opportunity to select varnishes that might be expected to render the best service in any of the zones represented. We secured these samples with the understanding that we would not publish names, etc., therefore we will not make a detailed record of the standing of each panel. The committee will be glad to furnish detailed information to any master painter who may be interested in the test.

H. A. Polhemus (Erie); a member of the committee, submitted the following on baking enamels:

To prepare a car body for enameling, remove all grease with gasoline and, if necessary, sandblast the surface to remove all the rust and scale. This must be done to insure a perfect and lasting job. Immediately after sandblasting give the surface a thorough dusting and apply a coat of priming enamel. Never let a sandblasted job remain over night without priming, as it will rust in a very short time. A steel passenger car when shopped for general repairs can be completed in less than half the time by the enameling process than by our present air-drying system, if there are proper facilities for doing the work. If the work is properly done, enameling will outwear the air-dried job by two years or more service, and the surface of the car is easier cleaned and the appearance is 100 per cent. better.

Mr. Polhemus exhibited several interesting panels of enamel work.

The test committee exhibited other specimens, among which was a film $\frac{5}{8}$ in. thick representing 365 coats of an oil retarded black carbon paint, each coat being applied daily during the period. When the film was finally lifted it was found that 38 per cent. of its weight had been lost, due to oxidation. Another film represented a retarded surfacing system which embodied 11 coats, applied in 12 days. Other films represented the practical oil retarding of the first class quick setting up paint oils found on the market. One was retarded with a high grade fish oil and another with the soya bean oil. It was recommended that these be given a good atmospheric test during the next year.

RUST INHIBITIVE PAINT.

W. A. Breithaupt and A. M. Johnsen (Pullman Company): Sheet steel as it is usually received from the mills has a surface coating of mill scale. If this mill scale coating was uniform in

*An unfortunate circumstance connected with the set of panels sent to Reading, Mass., prevented their exposure in time to be considered with the test, therefore are not included.

thickness over the entire surface and if it would stand heat and bending without chipping off, it would be desirable to leave this coating on the steel. The fact is, however, that it does in no way fulfill these conditions satisfactorily.

The sandblast, according to our experience, is the best method for removing this scale and rust. The steel should be painted immediately after sandblasting, or if it is not convenient to do so it should be placed in a room warmer than the outside temperature in order to prevent the condensation of moisture on the steel.

Sandblasting the steel provides a sufficiently roughened surface for the paint to thoroughly adhere to. The paint coats must be of such material that the vehicle or combinations of oils and varnishes give the pigment a coating which will resist to the utmost capacity the passage of moisture and gases. The pigment must also be alkaline to a slight extent and electrolytically positive to the steel.

The Pullman Company have made a large number of tests on such protective coatings for steel and now believe that the lesser the number of coats possible to give the desired protection, the better it will last. Where previously the 7 or 8 coat system was used we found that three coats of paint would give the desired capacity and ample protection to the steel. We then began the five-coat system, applied as follows: primer, body color, varnish color and two coats of varnish. The priming coat is made with an inhibited pigment as a fundamental requirement and a vehicle of good adhering quality. The prime factor of the second coat lies in the vehicle which must be the very best moisture and gas resister that can possibly be obtained. The pigment was also a very good inhibitive. The steel plates are dipped in these two first coats and baked at 240 deg. F. for 12 hours. Cars so painted have been in service thirty months, without the slightest indication of destruction of the paint. The outside surface was entirely free from checks and cracks and as a general assertion would state that the paint was in excellent condition.

A. J. Bishop (Nor. Pac.): While the baked surface on steel is perhaps a better inhibitive coating than ordinary or even special painted surfaces, it has several objectionable features besides the one fact that it does not entirely prevent rust. J. W. Lawrie, Ph.D., in a paper before the World's Eighth Congress of Applied Chemistry, states "that while it is true that the problem of the preservation of steel is not new to us, the artistic preservation and protection of steel from corrosion is a new problem. A railway passenger coach must not only be painted carefully, but it must be painted so as to be and present a pleasing appearance to the eyes of the traveling public."

Paints for steel have different functions than those for wood; therefore in painting equipment constructed with wood and steel these functions should be carefully noted. We have not the absorption into the pores of steel only to a limited extent, and for this reason a different quality of paint is required to secure stronger clinging effects than that of the pores of wood. While it is undoubtedly true that sandblasting gives a slightly roughened surface which aids materially in holding the paint to steel, it is necessary to assist an oil paint with something that is better as an adherent to steel than linseed oil. The fewer the number of coats of paint on steel which will give the maximum protection, the longer the wearing and the better service will the paint coats give. The pigment and vehicle must be such as to exclude from the steel surfaces all moisture and gases.

It matters not what coating is to be applied, special attention should be given to the application of the priming coat, especially on metal.

ECONOMY IN LOCOMOTIVE PAINTING.

D. A. Little (Penna.): With very few exceptions the present practice of painting locomotives is not economical to any degree. The cost of engine painting has been gradually growing less and less in the past 18 years until now it is necessary to repaint the locomotive at every shopping. H. W. Jacobs, formerly assistant superintendent of motive power of the A. T. & S. E., in

an article on British Railway Practice, recently published in the *Railway Age Gazette*, makes conspicuous comment on the beautiful appearance of the British Locomotive. He states that fourteen coats of filler, paint and varnish were applied to the jacket, cab, tender and wheel covers. This painting lasts from five to seven years, which immediately raises the question as to whether their methods or our methods are the more economical. It is evident that, apart from the question of economy, the British railway people believe in the advertising possibilities of a well-painted locomotive. Such engines give a fine balance to the general appearance of the train.

I would not advocate such an elaborate system as that of the English railways, but I would advocate a system such as was generally used about twenty years ago, which was good enough for all intents and purposes—reasonably cheap in cost and as durable as could be desired.

J. W. Gibbons (A. T. & S. F.): There are some roads that only consider the first cost when painting their equipment and endeavor to get along with cheap material. This is false economy. The Santa Fe use a good durable material for their locomotives which is applied in a thorough workmanlike manner, believing, by so doing, that the saving in maintenance will more than pay the difference between the cost of the second rate paint and the first class paint.

The steel underframe of tenders very seldom receives the protection it should. The overflow of the water and the wetting down of the coal seeping down through the coal becomes of an acetic nature, and when it reaches the underframe will lodge there and greatly augment the corrosion. One coat of paint applied when the tender is built and not maintained is not enough.

W. E. Woods (N. Y. C.): The use of cheap materials for painting locomotives has not proved economical, both from appearances and durability. The New York Central Lines are to rewrite the schedule for painting locomotives to conform to the Master Painters' Association standards.

SAFETY FIRST.

J. H. Pitard (M. & O.): The safety first movement which was recently launched by the railroad companies for the purpose of safeguarding the lives of their employees and the traveling public, is an act of benevolence that deserves the hearty co-operation of all departments of railroad operation to insure its success. The accidents in the paint department are perhaps too infrequent to be seriously considered and the principal question is the preventing of occupational diseases. Even these, however, are very few. They owe their origin to three principal sources: Hygienic shop conditions, unwholesome paint materials and the habits of the workmen.

There is nothing mysterious about shop hygiene, it simply means good sanitation, ventilating, and heating a shop in such a manner as will permit of the free escape of impure air and noxious gases and the admission of pure air. Failing to do this will lower the vitality of the workmen and correspondingly decrease their efficiency. Good ventilation is especially essential in a paint shop, due to the fine particles of lead dust, fumes from the paint materials and the necessarily heated condition of the shop.

With a few exceptions all paint materials are more or less unwholesome, the chief offender being white lead, which is liable to cause lead poisoning or "painter's colic." Wood alcohol, bi-sulphide of carbon, benzole, turpentine substitutes of various kinds and some other chemicals are unwholesome on account of their rapid volatile properties, their fumes permeating the shop. Such materials should be labeled, calling attention to their inherent dangers. It is possible to eliminate these detrimental odors by only using freely mixed paints and by keeping all paint stock in air-tight containers. The stock rooms should be especially well ventilated.

All employees should be compelled to keep themselves clean and should have clean overalls every week. They

should not be allowed to eat meals in the paint shop and the use of intoxicants and cigarettes at any time should be discouraged.

C. A. Cook (P. B. & W.): The solving of the problem of safeguarding ourselves and others, lies entirely within our own province, and can only be solved by the elimination of the element of carelessness so universally prominent and the development of our powers of observation. Safety appliances and rules avail themselves of no value if we allow ourselves to be careless, indifferent and disinterested in their use and observance. It has been said that 80 to 90 per cent. of injuries to railroad employees are due to their carelessness. The preservation of the health of the workman is of vital importance to the corporation that employs him and the deterioration of his vitality impairs commensurately his productiveness. The results of investigations and tests of the paint materials used in the paint shop should be carefully studied and considered when handling them in order to guard against any possibility of injury from them.

E. F. Bigelow (N. Y. C.): The absence of machinery in the paint shop does not permit a great deal to be done in the matter of safety devices, but nevertheless danger may be present and may also be overcome in a great degree. Probably the most accidents which occur in paint shops result from the use of the old style plank and horse staging, their imperfect construction and recklessness on the part of the workmen while using it. The practice of using a horse with legs of unequal lengths or having broken cleats is quite common, and with a warped or twisted plank form a very dangerous combination. A large number of accidents have occurred from this source, all of which were preventable had ordinary care been used.

Ladders used in shops having concrete floors should be equipped with movable basswood shoes, or some similar appliance, to prevent slipping. Lying face downward on car roofs to paint decks or clean deck glass is a common and very dangerous practice. In some shops this is now a dischargeable offense. Bad places in flooring, the occasional piece of wood with projecting nails lying on the floor are fruitful of sprained backs and ankles and blood poisoning, all of which may be reduced to a minimum by prompt repairs and a clear shop.

PAINT PROTECTION FOR STEEL EQUIPMENT.

J. F. Lanfersick (Penna.): No matter how good this kind of equipment is painted there are some other things that should be given consideration by the officials. I refer to the loading of coal cars with hot billets, slag, cinders, ashes or any other hot substances, also the striking of the sides of the cars with hammers and wrenches to start the load to fall out. If these practices are allowed to continue, it is useless to bother much about the painting of this class of equipment as they soon put the paint to the bad. The inside of the cars is not given the same attention in the way of painting as the outside. In most cases the interior does not receive any paint whatever. Before assembling the parts used in the construction of new steel equipment, all of them should be sandblasted on the exterior and given one coat of good linseed oil paint as quickly as possible after the sandblasting is completed. After the cars are constructed the outside and underneath parts should be given two additional coats of good linseed oil paint, leaving twenty-four hours between coats. After the last coat is dry the necessary stenciling should be done. This method will insure the paint to render from four to six years' service without repainting.

When this class of equipment is sent to the shop for repainting, all rust and foreign matter should be removed with the steel scraper and wire brushes from the outside and underneath parts of the cars. After the cars have been cleaned, the outside and underneath parts, if necessary, should receive two coats of good linseed oil paint, leaving twenty-

four hours between coats. After the last coat is dry the necessary stenciling should be done. As to interiors of coal carrying cars, I do not think it would pay to paint them. When refrigerator cars have steel ends, those parts on the interior of the cars should have at least one coat of paint to protect them from dampness. All other roofed steel or part steel equipment, such as automobile cars, should have all exposed steel parts painted with at least one coat of paint.

F. A. Weiss (C. of N. J.): Our steel freight equipment consists mostly of hopper coal cars and freight gondolas; the former cars are used in handling anthracite coal, which is particularly hard service. The first requisite is to remove the rust and place the surface of the steel in proper condition to receive its protective coating of paint; experience has taught us that the sandblast is not only the cheapest but the most effective way to do this.

The cars are painted immediately after the blasting is done, to protect them from moisture that may settle on them. After 24 hours the sides and ends of body are given the second coat of paint, and on the third they are stenciled and released for service, the trucks receiving but one coat. The paint we use and find to be durable is carbon black, reduced with raw linseed oil and one of the prepared extending oils. The proportions of which are determined by the quality of the extending oil.

Provided the question of time in getting the equipment through the shop were not so urgent as it is on most railroads, and also cost not considered such as essential element in the problem as it is generally regarded by the railroad management, the exterior surface of the car should be sandblasted and primed with red lead mixed with raw linseed oil, and finished with two coats of carbon black, carrying the maximum quantity of raw linseed oil, to which is added a portion of extending oil. The last coat need be applied only to the sides and ends of body. On new cars laps and joints should be given a heavy coat of red lead or carbon black before car is assembled.

Trucks which are repainted require but one coat, while new trucks should have two, carbon black being a suitable material for the purpose.

Oscar P. Wilkins (N. & W.): We have been, and expect to continue the practice of, testing out every promising material offered for the protection of steel, but up to the present time we have not found anything that will equal pure red lead and linseed oil as a primer, with two finishing coats of carbon black. A steel car surface carefully cleaned with a wire brush, scrapers, benzine and waste, primed with a freshly mixed pure red lead and linseed oil, and finished with two coats of good high grade carbon black, carrying maximum quantity of linseed oil, will give maximum wear with no increase in cost. We have been building steel cars at the Roanoke shop for several years and find fully 99 per cent. of the steel is free from corrosion, which renders it unnecessary to use the sandblast. As for the scale, I believe red lead is an inhibitor of rust, and if there is any rust under the scale the red lead, if not completely arresting its action, certainly retards it. We see this in evidence every day by steel cars that have been in constant service for eight or ten years with nothing but the initial painting, and aside from the hammer blows for loosening up the contents at certain points are in excellent condition.

ENAMELED INTERIOR TRIMMINGS.

John D. Wright (B. & O.): It is a well known fact that nearly all of the interior metal trimmings, lamps, parcel racks, etc., applied in passenger cars in recent years have been made of brass, and more thought seems to have been given to their design, and to the coloring of the metal, than to their cost. In other words, they have been considered more from an artistic than an economical standpoint.

The railroad companies are today confronted with conditions that force economy in many of the smaller details, some

of which, perhaps, have been overlooked in the past; and while the metal used on the interior of passenger cars may appear to be a trivial matter, in the aggregate it amounts to thousands of dollars. During the past year this point has been picked up by certain companies and it now looks as if some of the interior brass work will, sooner or later, give way to cheaper metals, and the baking enamel proposition makes this possible. Where the baked enamel finish is used many of the parts which are now removed every time a car is shopped for repairs could be cleaned with the interior of the car, without being removed and replaced. This expense would then be saved, to say nothing of the additional cost connected with the polishing, sandblasting, dipping, coloring and lacquering of brass work.

MAINTENANCE OF PASSENGER CARS.

T. J. Hutchinson (Grand Trunk): Maximum paint protection is a necessity in railway service and whenever these seven-day systems are introduced and hurried methods of cleaning continued at terminal points, we may look for future trouble that may be called paint failures.

When making out schedules of paint operation it must be remembered that the exterior protection lies chiefly in the varnish and whenever the service exceeds the life of the varnish it will be at the expense of the whole paint structure, which means extra time and material.

On the steel or wood-sheathed car after the primary coat I believe it will prove economical to apply not less than three coats of surfacing material where the old surfacing systems are followed. I believe that the present-day hurried method of cleaning and caring for the interior of the car en route and at the terminal point is false economy.

RAILWAY PAINT SHOP SUPPLIES.

H. Heffelfinger (Penna.): The best materials obtainable for painting and varnishing passenger cars and locomotives brings about the most economical results. The different localities through which the equipment is to run should determine to some extent the material to be purchased and in order to insure the correct material being secured the master painter should be consulted; he in turn being thoroughly familiar with the goods on the market. It is useless to expect good results when inferior paints and varnishes are used, and every master painter of this association should endeavor to make a reputation for doing good work and should do all that lies in his power to impress on his superior officers that he cannot attain the best efficiency in painting passenger equipment and locomotives without their aid in procuring the best and most lasting materials.

OTHER BUSINESS.

Other papers were presented on mirrors, the art of staining woods and paint brushes for steel cars.

F. W. Brazier, superintendent, rolling stock (N. Y. C.), in a letter to H. M. Butts, master painter of the New York Central at West Albany, N. Y., conveyed his regrets at not being able to attend the convention. He called attention to the importance of the steel car question as regards the best method of treating and preserving the steel. This problem is still in its infancy and the members by their discussions and exchange of ideas are in a position to greatly advance the art. He congratulated the convention on the interesting and pertinent subjects that were considered at this convention.

At the opening session T. J. Hutchinson, master painter of the Grand Trunk at London, Ont., presented the association with a beautiful banner painted by himself embodying the emblems of the United States and Canada. The following officers were elected for the ensuing year: President, Oscar P. Wilkins, Norfolk & Western; first vice-president, T. J. Hutchinson, Grand Trunk; second vice-president, H. Hengevelt, Atlantic Coast Line, and secretary-treasurer, for the tenth consecutive year, A. P. Dane, Boston & Maine, Reading, Mass.

SOME FREIGHT CAR TROUBLES.*

Poor Draft Gear and Attachments the Cause of Most of the Difficulty. Standard Test for Draft Gears Recommended.

By J. C. FRITTS,

Master Car Builder, Delaware, Lackawanna & Western.

The question has been asked as to why we are experiencing so much trouble with freight carrying equipment. In answering this question we must take into consideration the age and design of the cars and also the service they are called upon to perform. There are in round numbers about two and one-quarter millions of freight cars in the country, varying in age from one to twenty-five years, and beyond doubt a large number of the older ones are unadapted for present day train service.

Up to fifteen or sixteen years ago it was the general practice to build cars with short draft timbers extending from the



Steel Center Sills Buckled Within Twelve Inches of the Body Bolster.

end sill back to and butting against the body bolster. These draft timbers were secured to draft sills (5 in. x 8 in., in some cases 5 in. x 9 in.) with four vertical bolts. I know of some cases where this practice was in use within the last three years. As a protection to the car against shocks it was the practice to use one or two helical springs between the followers for a draft gear. Cars having draft arms and attachments of this type will not stand the strains they are subjected to in the present long trains.

One of the first things I would suggest doing to relieve the present unsatisfactory condition would be to substitute for the present short draft arm one of metal construction that will extend back of the bolster. This would lead to an inspection of such cars by their owners to determine whether any of them would warrant the expenditure necessary to re-enforce them with suitable metal draft arms and the application of a draft gear which would be a non-recoil, shock absorbing device. Cars which would not warrant such repairs or renewals should be confined to local service where the owner would be the only one to suffer the consequences of perpetuating such equipment or they should be destroyed, using the money received from the sale of scrap to apply on the purchase of new equipment. I believe if we were able to keep a record of the amount expended on each car to keep it in service we could easily prove that so much of the total amount used was being spent on a certain lot or class of cars that it would be economical to take them out of service.

*Extracted from a copyrighted paper presented before the Western Railway Club, Buffalo, N. Y., September 12.

The Master Car Builders' Association, at its June meeting this year, discussed at some length the question of withdrawing from interchange service all cars of 40,000 or 50,000 lbs. capacity. The discussion resulted in the following motion by D. F. Crawford:

"I would move that a committee of this association obtain from each of the members the situation as to each of their cars and ascertain if it would not be possible to make recommendation to the American Railway Association which will permit that for the benefit of the traffic conditions of the country we may set aside the older cars which are giving every one of us trouble that are moving them." The motion was carried.† This is a move in the right direction for instant relief and it behooves us as members of the Central Railway Club to get in touch with the committee as soon as it is appointed and render all the assistance in our power. I believe, however, the question is one of draft timbers, draft gear and buffing arrangement more than capacity, or even age. However, should we eliminate the old cars, we still have a large number left that are giving a great deal of trouble in the way of broken draft sills, draft timbers, end sills, couplers, etc., and with such cars it is often hard for the mechanical man to decide the most economical method to follow.

Careful investigation indicates that the stresses due to buffing and pulling have more than doubled in the past ten years so that cars built to meet conditions of ten or twelve years ago are not able to stand present day service without serious damage resulting to themselves as well as adjacent equipment. It can



A Common Failure in the Older Freight Equipment.

hardly be expected that the cost of maintenance due to failures will remain constant with the same equipment under such varying conditions of operation.

One of the very common failures in the older class of equipment is shown in one of the illustrations. It will be noted that the draft timber bolts have been pulled completed through the center sills which were of sound material and properly applied, the car simply having been subjected to greater stresses than it was possible for it to withstand. Due to the age and construction of this type of car the expense of applying proper re-enforcements would not be justified, and if the cost to maintain

†Daily Railway Age Gazette, June 18, 1913, pages 1488-9.

the older equipment were kept separate from the newer and stronger cars it could be easily shown that the proper course to pursue would be to destroy them and apply the scrap credit to new cars. There are, however, a large number of cars built at a later date that are subject to frequent failures, partly due, it would seem, to faulty construction. Many of the buffing parts have been constructed more from a theoretical standpoint than a practical one. Draft arms that extend only from the end sill to the body bolster should not be used in any case. They are the cause of numerous failures together with resultant interruptions of traffic and should be replaced either by the continuous steel construction or long metal arms in connection with open bolsters, locking them with both the top and bottom members. The general condition and age of the cars have to be taken into consideration when deciding which method of reconstruction should be used. This is the real problem for mechanical men to work out.

Steel center sills buckled within twelve inches back of the body bolsters are shown in another of the illustrations. It is thought by some car designers that if steel members are tied together at a distance in proportion to the width of the flange, it is sufficient and will meet all requirements. This practice may be mathematically correct but it does not prove out in service.

Another type of steel underframe construction that is giving considerable trouble is that in which, while the center sills have been properly tied and strengthened between the bolsters, one of the most vital points has been overlooked; i. e., the draft arm, made of pressed steel shapes, is riveted to the center sills which have no cover plate, or other means of tying them together, resulting in frequent serious damage and delays to both equipment and lading. The experience of the writer indicates that riveting the draft arms to the center sills to facilitate repairs does not make as strong a construction as continuous sills. It forces a weak construction to start with, because, in order to make such a connection secure against buffing shocks and pulling stresses, a large number of rivets must be used in making the connection, and the holes for the rivets are sure to weaken the structure; but in either case cover plates should be used. The top one should extend from end sill to end sill and the bottom one as far through the bolsters as possible without interfering with the movement of couplers or draft gears.

The part of the car designed to withstand the buffing and pulling stresses is giving more trouble than all the other parts taken together and for this reason must be strengthened. There are two methods used in re-enforcing old equipment.

First, for the older types of cars that we do not feel justified in going to the expense of providing with steel underframes, some roads are using a metal draft arm instead of the old oak timbers. These metal arms are being made of steel castings or standard rolled steel shapes riveted together in such a manner as to prevent the sills from spreading. I have tried both kinds and favor the steel casting for the reason that it withstands greater buffing stresses and can be moulded into one piece for each arm, making fewer parts for repair men to handle; the only extra parts needed are two or three tie plates riveted from arm to arm so as to make them both act together in receiving the shocks. Furthermore, the metal can be moulded in any shape, which allows of a distribution to give maximum strength. These arms, starting at the striking plate, should pass back through and over the transom for a distance of at least 24 in. and have square butting ends to receive a good stiff compression timber secured to the under side of the center sill.

In one of the latest designs of this type of steel casting draft arm, the compression timbers are placed in line between the needle beams and from each needle beam to the butting face of the metal draft arm. They should also be fitted so tightly that a jack is required to get them in place, and they should be of a good stiff section, at least 5 in. x 6 in. This type of re-enforcing, including a modern friction gear, can be applied to a car for approximately \$135.00 and I feel sure it is all that is necessary

for a very large number of the old cars that are now giving trouble.

The other method is to apply steel underframes complete at a cost of perhaps three times that of steel arms. This is pretty expensive but there are a large number of cars that will warrant this expenditure. Some of these underframes have been giving considerable trouble; therefore, we should look carefully into these troubles and design future frames with a view to overcoming them. In one of the latest types of steel underframe construction, which it is believed has the greatest strength for a given weight, the center sills are continuous and the cover plates extend through the body bolsters as far as the construction will permit. Auxiliary cover plates at the center are provided, both top and bottom. The body bolsters have been carefully considered, a few extra pounds of metal at this point will bring good results. Securely riveted to the center sills is a top plate 20 in. wide, which will throw a great deal of strength into the center column over the center plate, where the failures show we have the most work to do, and also acts as a gusset, strengthening the frame against lateral forces. The back lugs have been extended to the bolster and act as stiffeners for the sills. The area of the cross section at the bolster is between 24 and 25 square inches, which it is believed should be the minimum for a thirty-ton car. The center line of the coupler has been placed one inch below the neutral axis of the center members, this being a feature which does not seem to have been given proper consideration in the past. By keeping the force thrown against the car near the center of the draft sills, not only the liability of buckling but the breaking down at the bolsters is reduced to a minimum. Car designers should arrange the trucks and underframes so that this can be accomplished.

Experience from service conditions indicates very strongly that a modern friction draft gear gives the greatest protection, thus reducing the cost of maintenance and all other expenses incident to car failures. A very careful check of cars placed on shop tracks for repairs, in several parts of the country, shows that an average of 71 per cent. are so placed on account of defects that have developed due to shocks, and of a lot of 1,000 cars recently transferred it was found that over 80 per cent. of the failures were also due to shocks. Investigation of the cause of damage to lading indicates that a large percentage can be traced to the same cause. If these shocks are responsible for so great an expense to the railroads in general, what should be done to relieve the equipment? The desired results will never be obtained unless some device, between the frame and the coupler is installed, which is especially designed to destroy or absorb the force of the blow. Springs varying from 18,000 to 60,000 lbs. capacity have been tried and gave good protection some years ago when cars were of light capacity and handled in short trains, but they do not meet the requirements of today. A large number of railroads, realizing this, have started to replace the spring gear with friction devices that have from three to four times the shock absorbing capacity that it is practicable to obtain from a spring gear. In a device of this kind there should be no recoil. The force exerted by the recoil of a spring is practically as great as the force to compress it and results in much damage to equipment, especially in long trains.

The following statement gives the actual comparative service performance of these two types of gears, covering a period of twenty-six weeks, and shows very clearly the superiority of the friction gear:

		Number of Broken									Number of Cars Equipped.	Per Cent. of Failures
		Couplers.	Knuckles	Knuckle Pins.	Pocket Rivets.	Pockets.	Followers.	Springs.	Draft Spring Castings.	Total Failures.		
Various types of spring gears....		1526	710	2421	3143	207	1102	1620	1482	12211	15000	81
Various types of friction gears...		168	93	438	86	12	6	21	4	828	4805	17

The information was compiled from weekly reports submitted by inspectors and shop foremen at every point on the entire

system where repairs were made and is impartial and correct. The statement is self-explanatory and needs little comment. The majority of the spring gears were applied to wooden cars, which to a certain extent, form a cushion themselves and greatly protect the parts susceptible to failures. In order to obtain a correct comparison, only defects that are common to both wooden and steel cars were considered, otherwise the results would have been much more favorable to the friction gear. It is interesting to note that on 4,805 cars equipped with the friction gears there were 828 failures, or 17 per cent. of the total number of cars, while of the 15,000 cars equipped with spring gears 12,211, or 81 per cent., failed, a difference of 64 per cent. in favor of the friction device. A reduction of car failures of this magnitude means a great saving to the railroads in general because of the increased earning power of the cars and the decreased cost of maintenance, lost and damaged lading accounts, delays and interruptions of traffic, transfers of lading and switching through the various terminals. The sum total cannot be estimated, but that it represents an enormous figure I believe we will all agree. It will also be noted that for every coupler broken there were 1.7 knuckle pins which failed, showing that this is the weakest point in the car coupler. We know that the manufacturer as well as the M. C. B. Committee on coupler designs is considering this point and arranging to relieve the knuckle pin of a large part of the work the present design of coupler throws upon it.

I fear that some users do not appreciate what a draft gear is called on to do. I am free to confess that up to the time I started to investigate this question some years ago, I did not credit it with being such an important factor in the question of car maintenance, and other expenses incident to car failures. It is the only device that we apply to a car to protect it and its lading from damage. It has no other function to perform. It must destroy shocks from impact, shocks from pulling and shocks due to recoil. I will try and point out a few of the damages occurring to cars because of the draft gear failing to perform the work for which it is intended.

If it were possible to put a draft gear between the coupler and the car that would absorb the heaviest shock, we would eliminate broken couplers, and their removal would not be necessary until they are worn out, and I believe the coupler bodies of late design are sufficiently strong to last approximately the life of a car.

While knuckles wear out in service, there are a great many of them that break from shocks, and here again the draft gear that will relieve the coupler from shock also relieves the knuckles.

The failures of coupler yokes are due to shocks, and I think coupler yokes are being replaced by other forms of attachments, on account of pocket rivet failures which are due to the rivets being in shear under impact. In several years' investigation of the draft gear question I have satisfied myself that by eliminat-

ing this feature, the wrought iron, or forged steel yoke, with $1\frac{1}{4}$ in. x 5 in. section riveted to the coupler with two $1\frac{1}{4}$ in. rivets can be operated with very few failures.

I think no one will deny that draft springs are destroyed by shock, and with a properly designed friction draft gear I have learned that this failure can be reduced to a very low figure, for the reason that the draft springs are not driven solid even though the draft gear receives a shock sufficient to close it.

The end of a car is often burst by the lading it contains or the lading from an adjacent car. In either case it is on account of the lading moving in an effort to perform the work that the draft gear should have done. I believe that more attention should be given to re-enforcing this part of the car. It is also shock that does the greatest amount of damage to side doors.

Everyone knows of the trouble we are having with car roofs, and I think it will be agreed that it would be very little trouble to apply a satisfactory roof, if the car was standing still all of the time, but the roof being located so far above the floor line and the coupler below the floor line, with a more or less weak construction between the roof and the floor, it cannot help but be racked to its final destruction by the shocks delivered to the car through the coupler. It has been stated that a poor roof will last longer on a car equipped with an efficient draft gear than a good roof on a car with a poor draft gear. The writer is not in a position to either contradict or confirm this statement, but I do know that by replacing an inferior gear with an efficient one is equal to strengthening every part of a car that is susceptible to failure from shocks.

In closing, I have to offer as a relief to the present situation:

First—Re-enforcing the older types of cars that will not stand the expense of a steel underframe, with a long metal draft arm that extends through and over the body bolster; this in turn to be re-enforced, or backed up with good, heavy compression timbers.

Second—On such cars as will permit of the expenditure, the application of a carefully designed steel underframe.

Third—In all cases apply the draft gear that will destroy the greatest amount of shock with the entire elimination of recoil.

Fourth—The adoption of a standard specification for the testing of draft gear to determine its shock absorbing capacity, and amount of recoil, before purchasing.

Fifth—Substitute for the present wooden roof an all metal one as soon as it has been demonstrated what the proper construction should be.

NEW WESTERN PACIFIC FERRY STEAMER.

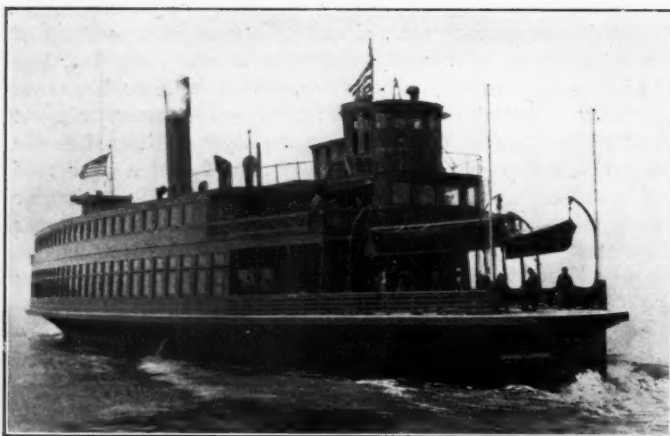
The new ferry steamer "Edward T. Jeffery," built for operation between San Francisco and Oakland, in connection with Western Pacific and Denver & Rio Grande train service, was



Engine House of New Ferry Steamer Edward T. Jeffery.

launched on July 19 and, after a trial trip on August 11, was placed in regular service August 15. The vessel is a double-end screw ferry with the following dimensions: length over all, 230 ft.; beam over guard, 62 ft. 6 in.; beam moulded, 42 ft.; depth moulded, 19 ft. 6 in. The hull of the vessel is steel throughout and is divided into a number of watertight compartments by five transverse watertight bulkheads and by longitudinal bulkheads on each side extending completely through the engine and boiler rooms. The vessel is equipped with engines capable of developing 2,000 i. h. p. The boiler room contains four Babcock and Wilcox safety water tube boilers with a total heating surface of 10,000 sq. ft.

The seating capacity of the boat is in excess of 1,200 passengers, with standing room for three times that number. On the main deck there are provided, in addition to the seating accom-



New Western Pacific Ferry Steamer.

modations, gangways for baggage, trucks and express wagons and galley, restaurant and dressing rooms. The interior on the main deck is finished throughout in white. On the saloon deck there is a large and completely equipped restaurant connected with a dumbwaiter on the galley with the main deck below. The cabin on the saloon deck is finished in mahogany and is provided with a raised omnibus roof for ventilation, the sash in the sides of this roof being fitted with art glass. The vessel is lighted throughout by electricity.

Particular attention has been paid to the fire protection system. There is a large fire pump in the engine room running constantly, this being connected by lines of piping to the hose reels situated at convenient points on both decks. As the pump is constantly in operation and the pipes are always full of water, a stream from the fire hose can be turned on instantly.

NEW LOCOMOTIVES FOR AUSTRALIAN RAILROADS.—A return has been issued by the New South Wales railroad department showing what is being done in the direction of new locomotive equipment. It is shown that the 20 engines ordered from the North British Company have now been supplied. At the Clyde Engineering Works, Sydney, a contract is being fulfilled for 50 additional engines of the same class. These are being delivered at a rate involving a monthly expenditure of \$77,860. In addition to these engines, an order for 40 other engines is being carried out at the Eveleigh workshops, near Sydney. At the same shops 40 engines, of slightly different type, are being turned out. The federal government is also making provision for locomotives for its transcontinental line from Port Augusta, South Australia, to Kalgoorlie, Western Australia. An order for four engines has been placed with the Clyde Engineering Works at a cost of \$115,000. Foreign bidders tried for this order, but although an American firm tendered approximately \$90,000 (\$25,000 less than the Clyde works), the Australian concern secured the business. This is interesting as showing the trend toward supporting local industries.

THE ARMSPEAR SPHEROIDAL LENS.

This lens, designed to widen the territory from which a switch or signal light can be seen, is in use on the Long Island and other roads for tail lights for trains and in other situations. It is useful especially in tail lights on roads having many curves; and in switch lights, at isolated points where the approach is on a curve from which the switch is visible a considerable distance away. With the ordinary lens, designed to transmit light in approximately parallel beams a switch light may be almost or quite invisible at a short distance because of the impossibility of fixing the lamp in a position to throw its rays toward more than a small part of the area through which an approaching train passes. Likewise, a light, even where the line of road is straight, may become ineffective from a slight error in alinement of the lamp or from looseness on the bracket due to lack of care or neglect in maintenance.

The spheroidal lens has been shown by tests to project red, green and white light, as compared with the ordinary $5\frac{3}{8}$ in., smooth face, semaphore lens, as below, the wick being $\frac{5}{8}$ in. wide and the flame measuring less than 3 candle-



Fig. 1.

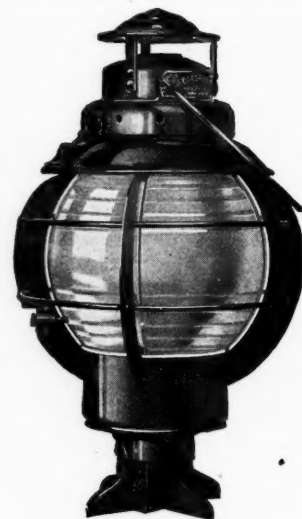


Fig. 2.

power. The colored roundels used in these tests, placed in front of the white lens, were $8\frac{3}{8}$ in. in diameter:

	Armspear lens.		Common lens.	
	Distance. Miles.	Spread, degrees, either side of axis.	Distance. Miles.	Spread, degrees, either side of axis.
Green	0.81	45	0.81	10
Green	1.00	45	1.00	9
Green	2.00*	45	2.00	6
Green	3.00	..	3.00*	4
Red	3.00	45	3.00	4
Red	3.29*	45	3.29	3
Red	4.00	..	4.00*	2
Uncolored	4.37*	45	4.37	2
Uncolored	5.60	..	5.60*	1

*Maximum distance at which this light could be seen.

It will be seen that though, with the spheroidal lens the light cannot be seen so far, it can be seen through a lateral range of 90 degs., and that it can be seen an ample distance for all practical purposes; two miles for green and 3.29 miles for red.

The illustrations show the section of the lens (Fig. 1) and the switch lamp (Fig. 2). The four glasses in the lamp are held fast by means of a locking arrangement at the top, controlled by a key, and can be readily changed; so that a single design of lamp answers for a switch light where two colors are needed, a tail lamp with four (three green and one red) or a semaphore, where only one color may be needed. For a semaphore the standard R. S. A. socket is fixed to one side of the lamp, and for a tail light the usual bracket is attached, by a ring, at the bottom.

This lamp is made by the Armspear Manufacturing Company, 447 West Fifty-third street, New York.

Maintenance of Way Section.

THE October Maintenance of Way Section will be published in the issue of October 24 instead of October 17, in which it would regularly appear. This change is made in order to allow a full report of the convention of the American Railway Bridge and Building Association, which will be held in Montreal, October 21 to 24, inclusive, to be included in the Section.

IT is not necessarily a universal condemnation of the morals of section foremen to say that it is important to have them make daily reports of the labor used on their sections, but it would be contradictory to fact to say that all incorrect monthly time rolls are due to lapses of memory. A system which requires a daily report makes petty grafting very difficult, and such a system should be welcomed by the honest foreman because it eliminates charges of dishonesty which might result at present if he unconsciously errs in making out his monthly payroll. Daily reports, such as those described elsewhere in this issue are not new, but their adoption has not been general on account of the clerical work involved. The roads that have tried these systems, however, are now their strongest advocates.

THE scarcity of efficient maintenance labor makes it essential that every effort be put forth to keep in the service the good men that are secured. Many roadmasters and supervisors are working on various systems of holding their laborers and keeping them satisfied and, in many instances, are securing good results. We expect to publish in the next Maintenance of Way Section short discussions from several men who are using novel plans for holding labor, and we solicit contributions from all who are interested in this subject and who have any suggestions to offer. Special attention will be given contributions describing plans actually tried out. Contributions must be received by the Engineering Editor of the *Railway Age Gazette*, 608 South Dearborn street, Chicago, by October 10, and those accepted will be paid for at space rates.

THE suggestion made by Mr. Park in his address before the Roadmasters' convention in Chicago last week, that these men can exert an important influence to assist their roads in combating the present wave of unreasonable legislation is an important one. No other railway officer comes in contact, directly and indirectly, with as many residents along his line as the roadmaster. The railroad is a neighbor to adjoining farmers, and as such has the usual problems of fence maintenance, stock claims, etc. In these matters the roadmaster, either directly or through his section foremen, comes in contact with these people continually and can make many friends for his road. While the roadmaster and section foreman have stood out conspicuously for their loyalty in these days of organized labor, they have not perhaps realized the opportunity they have to influence public sentiment in favor of the railways.

AT no recent convention of the Roadmasters' Association has there been such an evident desire to carry on work to the exclusion, if necessary, of the entertainment features, as was evident this year. This tendency was illustrated on Thursday afternoon. When it became evident that the discussion of one of the committee reports could not be completed at the morning session to permit the members to attend a baseball game previously arranged for that afternoon, the members decided almost unanimously to substitute an afternoon session for the game. This spirit was in evidence throughout the entire meeting, and was shown in the discussion, as well as in the close attention given to the exhibits. The success of this year's convention was largely due to the increased interest in the work of the association, stimulated by the selection of live subjects and aided by the adoption of a central location for the convention. The

discussions were more spirited and practical than in previous years, and were frequently prompted by the president, who urged the presentation of data based on actual experience.

THE CONTRACTING OF MAINTENANCE WORK.

IN considering the subject of the contracting of maintenance work it must be borne in mind that such work is of two classes which are radically different. In one class may be grouped all work not directly affecting the movement of trains, such as the mowing of right of way, the making repairs to buildings, platforms and fences, plumbing, etc. In the other class is included the actual maintenance of track and bridges, comprising the greater portion of maintenance work.

Considerable progress has been made in contracting work of the former class, as was brought out in the discussion of the report on this subject presented before the Roadmasters' Association last week, and it would seem that there exists an opportunity for a wider application of this method to advantage. The Erie's practice of contracting minor repairs on station buildings to local men, and permitting the agent to pay for this work promptly upon its completion from his cash on hand up to \$25 on authorization of the division engineer, has been described in these columns. The contracting of the mowing of right of way to farmers along the line is commonly followed and usually not only results in a saving to the railway, but creates a better feeling in the community. The handling of such work in this way in these times of labor shortage, which is more acute on the railways than in the small farming communities, allows the employment of the regular forces on the more urgent track work.

In the case of the maintenance of track and bridges, however, a different condition prevails, and comparatively little progress has been made in the contracting of such work. The contracting of section work upon a lump basis to a foreman was tentatively tried on one or two sections on the New York Central lines, but abandoned in a short time. Another eastern road contemplated contracting the renewal of ties, but the subject was dropped because of labor difficulties. The contracting of the maintenance of track and bridges differs from the contracting of other maintenance or construction work in that a large part of railway maintenance is preventive rather than remedial, and the thoroughness and efficiency of such work depends on the care and judgment of the foreman. The routine inspection of track and bridges, the removal of brush from above the bridges, and similar duties are fully as important as the renewal of ties and rails or the replacing of defective stringers. Work of the first kind cannot readily be paid for on any other basis than on a day basis, as at present, and the contracting of it on any other basis, with the resulting division of responsibility, will have a tendency to increase the hazards of railway operation.

The moving of trains should be the prime objective of all railway employees. The object of a contractor, on the other hand, is to accomplish the piece of work in hand as rapidly as possible. If these interests conflict, as they cannot fail to do in maintenance work, it is only natural that the contractor shall take chances in order to avoid delay to his work. Again, in handling any work where delays from traffic must be considered, a contractor must for his own protection, bid on the basis of the maximum delays to be apprehended, while, although delays from traffic to railway forces increase the cost of the work, they also bring increased revenue into the railway treasury. Railways can only let work in small contracts to the greatest advantage, for contracts large enough to warrant contractors recruiting large forces would result in organizations similar to those now employed by the railways with the attendant difficulties of securing labor and of supervising it that the railways now meet. Another point is that the employees of the maintenance department are now called on for all kinds of emergency duty, from clearing wrecks to breaking strikes, and the value of such services must be considered in this connection.

Letters to the Editor.

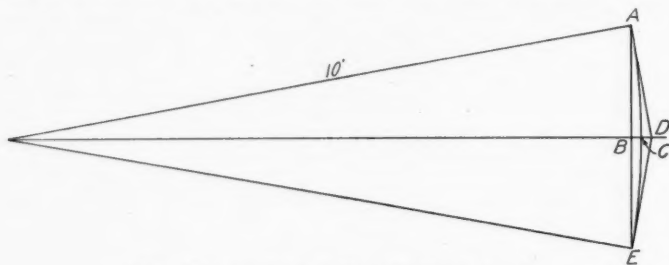
ANOTHER METHOD FOR CALCULATING FROG ANGLES.

HARRISBURG, Pa., August 16, 1913.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In the *Railway Age Gazette* of August 15, 1913, F. W. Rizer shows the results obtained by calculating the angle of a frog of any given number by the two common methods, namely: by the sine formula and the tangent formula. A third method can be used in which no tables are required.

In the figure representing the angle of a No. 10 frog, AB is assumed to be 0.5 ft. if the sine formula is used and the same assumption is made for AD when the tangent formula is used. If the arc AC, whose length is intermediate between AB and AD is assumed to be 0.5 ft., then the arc AE is 1 ft. and the frog angle which is the angle subtended by this arc is equal to one-



Line Diagram of a No. 10 Frog Angle.

tenth of a radian. A radian contains 57.3 deg., a number which is familiar to all who have worked with railroad curves. Hence, the angle of a frog can be found by dividing 57 deg. 18 min. by the number of the frog. These results will always lie between those secured by the sine and tangent methods, their differences from those calculated by Mr. Rizer with the sine formula being 2 deg. 11 min. for a No. 4 frog, 37 min. for a No. 6, 15 min. for a No. 8, 7 min. for a No. 10, 1.5 min. for a No. 15, and 0.3 min. for a No. 20. Such errors as these can frequently be overlooked for the sake of a handy rule of thumb.

J. M. FAIR.

CALCULATING FROG ANGLES.

CHICAGO, Ill., August 23, 1913.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The point raised by F. W. Rizer in his article on "Two Methods of Calculating Frog Angles," in the *Railway Age Gazette* of August 15, was very thoroughly discussed a few years ago on the floor of the convention of the American Railway Engineering Association in connection with the report of the Track Committee. The committee's recommendation that the tangent method for computing the frog angle be adopted finally prevailed and this method is embodied in the association's Manual of Recommended Practice. The writer has maintained for some time that many of the engineering field books are in error in regard to track and switch formulae, but in this particular instance it would seem a pretty broad statement to say that the A. R. E. A. had adopted the tangent method "for some unknown reason." It has only been necessary once in the writer's experience to compute accurately a table of frog angles. In this case the tangent method was used with as little inconvenience, it is believed, as would have been experienced with the sine method. For all practical purposes there are dozens of tables giving the frog angle to the nearest minute, which is as close as the frog will be made and the work staked out. As a matter of fact, the writer in drafting uses a compass to lay off frog angles, which is equivalent to using the sine method. In measuring the angle of frogs already in track, one uses a match, pencil, 2 ft. rule or whatever is convenient, and very probably secures a result between that of the tangent and sine method, but accurate enough for all purposes. It is probably impossible to

tell whether a frog drawn with the ordinary drafting instruments to any customary scale is laid out by the tangent or sine method, so from a practical standpoint there is little difference.

From the viewpoint of the field book authors and the American Railway Engineering Association, there is a logical reason why the sine method should not be used. When switch and track formulae are carried beyond the frog the sine method is not readily and consistently incorporated in the most convenient formulae. Some of the simplest and most commonly used track formulae are derived from the definition of the frog angle by the tangent method and are easily and consistently proved to be true when we consider the frog angle F to be equal to thrice the

angle whose tangent is $\frac{A}{B}$, as shown in Fig. 2 of Mr. Rizer's article.

S. S. ROBERTS.

ABSTRACT OF ENGINEERING ARTICLES SINCE AUGUST 15.

The following articles of special interest to engineers and maintenance of way men, and to which readers of this section may wish to refer, have appeared in the *Railway Age Gazette* since August 15, 1913:

New "Soo" Freight Terminal at Chicago.—A very complete freight terminal located near the heart of the city of Chicago has been built for the Minneapolis, St. Paul & Sault Ste. Marie, which solves in an unusual manner the problem of keeping open the streets across the site of the terminal and at the same time providing an unobstructed area for tracks, warehouses and team ways. The details of this new terminal were described and illustrated in the issue of August 22, page 321.

One Plan for Solving the Chicago Terminal Problem.—A letter to the Editor by Gustave E. Lemmerich, proposing a union station layout for the city of Chicago to be used by all roads except the North Western and the Illinois Central, was published in the issue of August 22, page 320.

An editorial note calling attention to the necessity for co-operation between the legal departments and engineering departments as to proposed legislation was published in the issue of August 22, page 315.

The Darjeeling Himalayan Railway.—A general description of a 2 ft. gage road which climbs the Himalayas on a 4 per cent. grade, was published in the issue of August 22, page 327.

Construction of New Quebec Bridge Piers.—Unusual interest has been aroused by the project to construct the longest cantilever bridge in the world over the St. Lawrence river near Quebec. The unusual features of the foundation work for this structure, including the building and launching of cofferdams which have rarely been exceeded in size, were described in the issue of August 29, page 365.

Nomographic Method for Finding Center of Gravity and Moment of Inertia.—A simple and convenient method of finding the center of gravity and the moment of inertia of rail sections by the use of nomograms and common graphical methods, which was worked out by M. J. Eichorn, Chicago, was published in the issue of August 29, page 381.

An editorial note calling attention to the important railway developments which are taking place under the stress of competition between the great systems in the Northwest was published in the issue of September 5, page 398.

New Ohio River Bridge at Kenova, W. Va.—The Norfolk & Western has replaced a 3,942 ft. bridge over the Ohio river, placing the new structure on the old piers without any interruption to traffic. The unusual features of this work, including the methods of cutting off the piers and erecting the new steel from material tracks carried outside the trusses, were described in the issue of September 5, page 407. An editorial note, commenting on the difficulties of erection of the Kenova bridge and the methods used in this work, was published in the same issue, page 400.

Valuation of Kansas Railways.—A discussion of the methods used by the Public Utilities Commission of Kansas in valuing the railway properties of that state, which was abstracted from the first report of the commission, was published in the issue of September 5, page 424.

Mountain Railway Electrification.—Numerous studies of the economies to be effected by the electrification of steam trunk lines have been made, most of which were prepared by electrical engineers and strongly favored such electrification projects. An abstract of a paper by Allen H. Babcock, electrical engineer of the Southern Pacific, published in the issue of September 12, page 447, discusses this problem with reference to the Tehachapi Pass of the Southern Pacific and reaches somewhat different conclusions. An editorial note commenting on the importance of this paper was published in the same issue, page 441.

Construction of the Portland, Eugene & Eastern.—Certain branch lines of the Southern Pacific near Portland, Ore., are being electrified and connecting links built to form the Portland, Eugene & Eastern system. This work of construction and electrification was described and illustrated in the issue of September 12, page 453.

DAILY TIME AND MATERIAL REPORT SYSTEMS.

Methods Being Tried by the Maintenance Departments of Several Roads to Secure Better Labor and Material Reports.

The importance of a knowledge of the actual cost of work has been pointed out more than once in these columns. It is only by the use of such data that accurate estimates of the cost of proposed work can be made and it is always advisable to have records complete and accurate enough to allow the officer in charge of the work to check material and labor separately and satisfy himself that material charges have been properly made and that the foreman has so handled the work as to keep the cost within reasonable bounds. Properly kept cost data is even more valuable if it is available while the work is being done, as it is then useful in the economical direction of the work and in enabling the officers in charge to keep in close touch with the progress that is being made. The systems of monthly time and material reports which are in common use in the maintenance department do not provide the basis for the best system of cost keeping, and realizing this, several roads have experimented with daily report systems. Such systems have a number of obvious advantages and if they can be made without requiring too much additional clerical work, they should meet with general approval.

C. B. & O. METHOD.

The Chicago, Burlington & Quincy has had in service on the Aurora division since April 1, 1911, a system of daily reports which has given good satisfaction. Instead of the monthly time rolls which were formerly kept by the section foreman and extra gang timekeepers, a daily report is required, showing the time that each man in the gang has worked, with the kind of work on which he was occupied. These reports are sent to the division office each night, where the time is entered on the regular monthly roll. The daily report is made on a special blank, a copy of which is reproduced herewith, and is mailed

B-6-11-400



Form 4179.

Chicago, Burlington & Quincy Railroad Company.

DAILY TIME REPORT.

Section No. _____

DIVISION.

Gang No.

Date _____ 191_____

Station

No.	NAMES	OCCUPATION	Hours
		Total Time	

C. B. & Q. Daily Time Report for Track Forces.

before the foreman goes home in the evening; a special envelope being used to facilitate delivery. This plan is in use in all branches of the maintenance department, including the bridge and building, water service, signal and track forces. The time of upwards of 3,000 men has been kept in this way during the summer months.

The new method is liked both by the foremen and the officers in charge. It simplifies the work of the foreman by spreading the clerical work over the month instead of concentrating it on the last day. Under the old system many foremen are required to spend half the night at the end of the month getting out the monthly time roll; a feature of the work which keeps many

excellent trackmen out of foremen's positions. The daily reports also eliminate much of the rush which was common in the division office at the end of the month incident to making up the pay rolls and any errors, either in the time or the distribution, are discovered as they develop rather than at the end of the month during this rush. While the amount of clerical work in the office is increased somewhat, this has not been found to be enough to require any additional help. The daily system is a very good check against either intentional or unintentional irregularity on the part of the foremen. When the time rolls are sent in at the close of each day's work, there is no chance for him to forget just how many days a laborer missed, as was sometimes the case under the monthly system and as he is liable to frequent checking by superior officers, there is very little opportunity for his intentionally placing on the roll a man who did not work.

NEW YORK CENTRAL METHOD.

The system of daily reports in use on the N. Y. C. & H. R. differs from that described for the Burlington principally in the provision for more detailed records of the distribution of labor,

FOREMAN'S DAILY REPORT OF LABOR

[illegible]

N. Y. C. & H. R. Daily Labor Report.

the completed work, work in progress, and other memoranda of interest to the supervisor. The New York Central requires the foremen to make up their time rolls, however, which are sent in semi-monthly. The blank used for the daily labor report, which is reproduced herewith, includes a column for "amount," which is usually filled out in the supervisor's office from the total time and the rate. At least one supervisor, however, feels that it is advisable to require the foremen to figure up this amount and enter it on the blanks so that they may see how much the work of each man represents each day, with the idea that if the amount of money they are responsible for is kept constantly before them, the foremen will be more careful in supervising the work. The distribution shown on the daily report is transferred in the supervisor's office to a sheet showing daily distribution of labor for each month. On one side of the sheet the number of hours of work each day is set down opposite the description of work as indicated by the foremen and

[illegible]

Illinois Central Monthly Time Roll Form.

B-12-11-87M

Form 2347.

Chicago, Burlington & Quincy Railroad Company.

DAILY RAIL AND TIE REPORT.

Section
or Gang No.

Location

Date 191

RAIL RECEIVED

TIES RECEIVED

Car Initial and Number	Point Received From	Quality of Rail	PATTERN WEIGHT			
			LB.	LB.	LB.	LB.
			Number of Feet	Number of Feet	Number of Feet	Number of Feet

Car Initial and Number	Point Received From	NUMBER OF TIES	
		Hard Wood	Soft Wood

RAIL SHIPPED

TIES SHIPPED

Car Initial and Number	Point Shipped To	Quality of Rail	PATTERN WEIGHT			
			LB.	LB.	LB.	LB.
			Number of Feet	Number of Feet	Number of Feet	Number of Feet

Car Initial and Number	Point Shipped To	NUMBER OF TIES	
		Hard Wood	Soft Wood

RAIL USED

TIES USED

PATTERN WEIGHT				Quality of Rail	Show whether Main, Passing, Side or Industry track Rule 2.
LB.	LB.	LB.	LB.		
Number of Feet	Number of Feet	Number of Feet	Number of Feet		

NUMBER OF TIES		Show whether Main, Passing, Side or Industry track Rule 2.
Hard Wood	Soft Wood	

RAIL TAKEN OUT OF TRACK

REMARKS

PATTERN WEIGHT				Quality of Rail	Show whether Main, Passing, Side or Industry track Rule 2.
LB.	LB.	LB.	LB.		
Number of Feet	Number of Feet	Number of Feet	Number of Feet		

FOREMAN.

INSTRUCTIONS FOR REPORTING RAILS AND TIES

1. This report should show actual transactions of Rails and Ties and should be sent to the Superintendent daily.
2. Under name of track show whether Main, Passing or Side Track (Freight, Passenger or Freight and Passenger). If Track is known by name or number or is a joint facility track, show such information on this report.
3. When the Section or District the Extra Gang is Working on extends over more than one accounting division or state, special care should be taken to show the transactions of each Accounting Division or state separately.
4. See that proper addition is made for the number of feet contained in leads and that proper deduction is made for the number of feet contained in frogs.
5. Report all ties as hardwood and softwood, according to the General Manager's Standard Tie Classification.
6. When no rails or ties are received, shipped, taken up or used, blank report should be sent to the Superintendent.

C. B. & Q. Daily Rail and Tie Report.

into the subgrade, the slabs will entirely prevent this action.

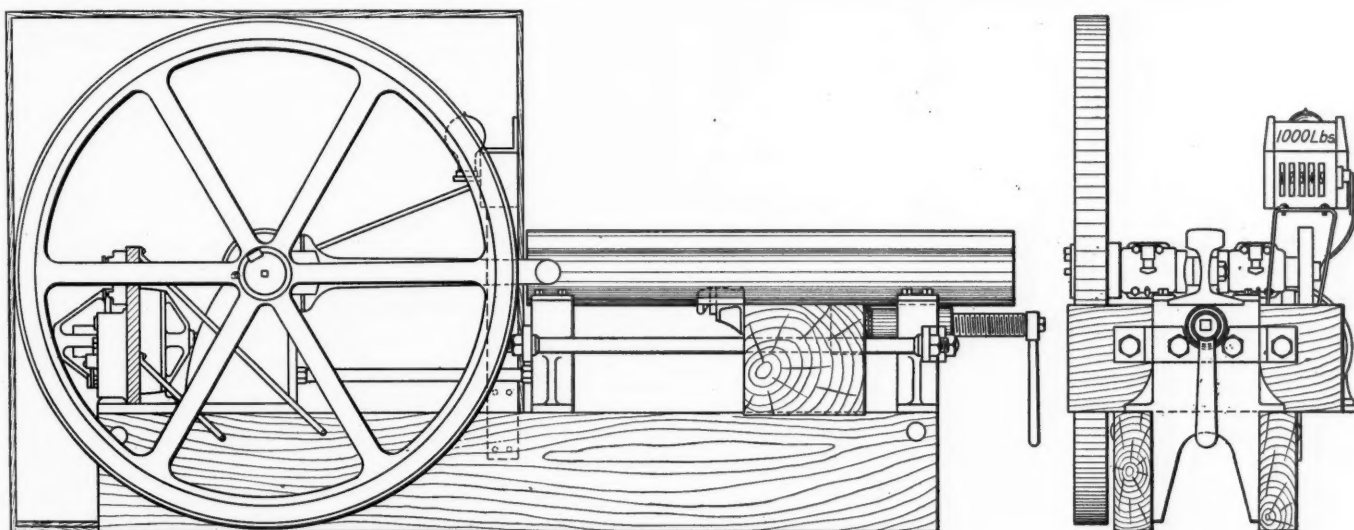
The embankment being of clean gravelly material and quite porous, it was found by trial that enough of the grout seeped into it to increase the nominal thickness of the slab about 2 in. if the ground was dry; but when a hose was used, in order to settle the earth as much as possible before casting the slab, the nominal thickness was not much increased. The concrete was composed of one part Portland cement, three parts sand and six parts of 2 in. broken limestone or trap rock, all hand mixed and very wet. Just before initial set, the slab was sprinkled over with broken stone, to provide a better bond for the ballast, and thus minimize the tendency of track and ballast to shift, especially laterally due to the sharp deflection of moving trains. The use of rods or mesh for reinforcing the slabs was at first thought necessary, but upon attempting a rational design, it was concluded to omit all reinforcement, and consider the concrete slab to act like a pavement rather than a spread footing.

The work comprises the support of 50 crossings and switches, mostly No. 10 with about 90 foot leads, 32 of which are west and 18 east of the station, the total area covered being about 70,000 sq. ft. The average cost per switch or crossing was about \$90. The cost of labor for clearing the site, excavating, building runways and mixing platforms, unloading and handling material and mixing and placing con-

RAIL ANCHOR TESTING MACHINE.

A machine for making a practical test of rail anchors has been designed and built by the Q and C Company, New York, which is being used for regular tests at the company's offices, and will be exhibited for advertising purposes whenever occasion offers. The machine formed the principal part of the company's exhibit at the Roadmasters' and Maintenance of Way Association convention in Chicago, September 9-12.

The anchor to be tested is placed on the base of a short length of 100-lb. rail in the same manner as in the track, and by moving this rail longitudinally the anchor is pushed against a block held in place by a heavy spring so that a pressure of 1,000 lbs. is applied at each blow. The rail is carried in bearings on castings which allow a movement of 6 in., the power for operating the machine being secured from a $\frac{1}{2}$ h. p. 110-volt d. c. motor mounted on a bed plate casting adjacent to the rail supports. This motor can be driven by attaching a cord to any light sockets and as the operating machinery is enclosed in a substantial box the machine can be readily moved and quickly attached for a test. The speed of 1,700 r. p. m. at which the motor runs is reduced to 30 r. p. m. by a worm gear which drives a shaft to which is attached a heavy 36-in. flywheel. A 3-in. crank in this shaft serves to transmit the movement to the rail by



Rail Anchor Testing Machine.

crete averaged about 6 cents per sq. ft. and the materials cost about 6 cents, or a total of 12 cents per sq. ft. Deducting, say, 2 cents for the ballast which would be saved, the net cost of the slabs would be 10 cents per sq. ft., or \$1 per lineal foot of track. On new work \$5,000 per mile would probably suffice to install such slabs, but under main line traffic this figure might be doubled. There are undoubtedly many miles of track where such a capital charge would be justified, both by reduced maintenance expenses and better track.

The slabs at Jamaica were built under the direction of L. V. Morris, chief engineer of the Jamaica improvements, and J. R. Savage, chief engineer of the Long Island Railroad.

SIBERIAN RAILWAYS.—The railway department of the Russian ministry of finance which investigates all applications for permission to survey or construct railways by private enterprise, has published a list of new lines, the building of which is considered by the department to be necessary for the normal working of the Siberian Railway system. These new lines (five in all) are chiefly concerned with the development of Western Siberia, but a number of important surveys have also been authorized within European Russia.

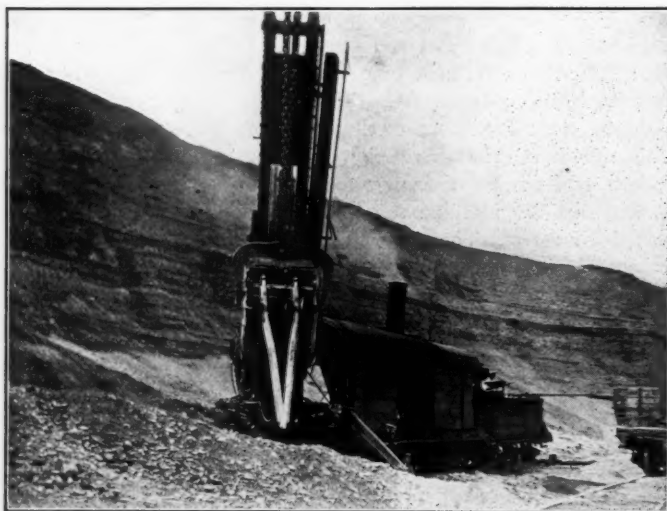
means of a crank arm attached near the end of the rail section.

The block which the rail anchor strikes has approximately the same cross section as a tie, but is faced on the edge which receives the blow with a thin plate to prevent damage to the wood. This tie is held in place by a coil spring bearing against the outer casting which supports the rail. A carefully tested spring requiring 1,000 lbs. per inch of compression is used to gage the force which is applied to the anchor at each blow. An electrical contact is provided which flashes an electric light on top of the apparatus when the spring is adjusted to 1 in. of compression. A screw adjustment regulates the amount of compression. The number of blows which an anchor receives in a test is automatically recorded by a counter connected directly to the main shaft. A Vaughan anchor which was put on this machine the first day of the exhibit received 250,000 blows during the week without showing any signs of movement or other damage.

SPANISH RAILWAY CONCESSION.—The concession and construction of a 36-mile strategic railway to run from Huelva to Ayamonte through Gibraleon, has been awarded to La Sociedad Espanola de Ferrocarriles Secundarios, petitioner for the railway, for the sum of \$2,684,993. Correspondence should be addressed to Calle de Marques de Cubas, 5, Madrid, Spain.

A DEVICE FOR CAVING DOWN BANKS AHEAD OF A STEAM SHOVEL.

The accompanying photographs show a device which has been used in a gravel pit at Terrace Park, Ohio, on the Cincinnati division of the Pennsylvania Lines West of Pittsburgh for several months this season to undermine a gravel face about 50 ft. high and to bring down this material at a safe distance ahead of the shovel. This face would stand almost vertical for the upper 30 ft., and if undercut by the shovel dipper, cave down in quantities sufficient to bury the front truck and jack arms of



Attachment in Position on Shovel Dipper.

the shovel and to endanger the workmen in the pit. The first expedient resorted to to avoid this difficulty was the use of long pike poles to undermine the gravel by hand, but this was slow and dangerous.

Finally two pieces of 70 lb. rail 15 ft. long were bent as shown in the photographs. Two ends were bolted together to form a point and the other ends were fastened by "U" bolts to a bar of 1 in. x 4 in. steel which was bent at the ends to fit inside the dipper. These ends of the bar and the sides of the dipper were drilled for 1½ in. bolts by which the device was fastened to the dipper. No other means of fastening was necessary as the rails fitted between the dipper teeth and were held in place.

The device can be applied to the dipper in 5 min., and cave down 50 cars of gravel in 15 or 20 min. by swinging the dipper slowly around and allowing the point to cut a few inches into the gravel at each swing. As this might bring some unusual strain upon the shovel if not carefully used, the device could be modi-



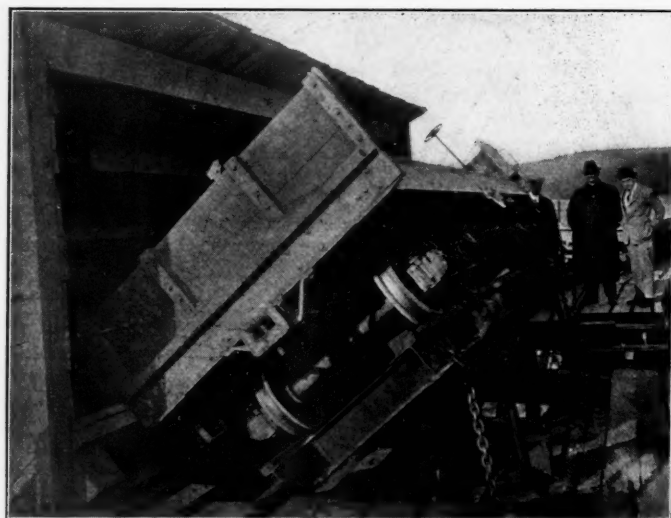
Carving Down a Bank.

fied to provide a hinged joint which would allow its yielding under excessive pressure, this pressure to be controlled by a spring or by small bolts.

This device was used under the direction of F. N. Crowell, division engineer of the Cincinnati division, to whom we are indebted for the above information.

A NEW QUARRY CAR.

Cars intended for handling stone from a quarry to a crusher should be as low as possible if they are to be loaded by hand and should be designed for automatic dumping at the crusher to save time in unloading and cost of rehandling. It is very difficult to design a car with a body which will dump that is not so high as to be difficult to load by hand unless the capacity of the car is made so small that it is uneconomical. Cars have been designed with a separate body hinged on one side of the underframe which are dumped by an air or electric hoist at the crusher, which engages the side of the car opposite the hinge and lifts the body up so that the load slides into the crusher. Such a car is expensive, however, as it requires practically two underframes. The Orenstein-Arthur Koppel Company, Pittsburgh, Pa., recently designed for the Warren Silica Company, the car shown in the accompanying illustration, which is designed to meet all the requirements of a quarry car at a low



Dumping the Koppel Quarry Car.

cost. The car itself is a very low type double truck flat car with a platform 20 ft. long x 6 ft. 6 in. wide, the level of the floor being only 2 ft. 9 in. above the rail. At the crusher is installed a platform hinged on one side and supported on the other by two pneumatic cylinders. The loaded cars are run one at a time onto this platform, the car is anchored by a catch from the platform which engages a hook on the under side of the car and by admitting air into the platform cylinders, the tippie is lifted on that side so that the car floor assumes an angle of 45 deg., allowing the load to slide off into the crusher. Upon releasing the air from the cylinders the tippie returns to its original position and the train pulls up, bringing another loaded car onto the platform. The operation of this car has proved very satisfactory and the saving in time and labor makes it very economical.

RAILWAYMEN'S FLOWER SHOW.—A flower, fruit and vegetable show held in an arch under Clapham Junction, England, a short time ago consisted entirely of exhibits grown by employees of the London & South Western Railway, residing within a radius of 27 miles from the station, and who are also members of the London & South Western Railway Temperance Union. The first exhibition was held in 1908, when only 73 entries were received. This year there are 500 entries.

CONCRETE BUILDINGS ON THE LACKAWANNA.

Passenger Stations and Signal Towers of Substantial Construction and Attractive Design Adapted to Local Conditions.

The Delaware, Lackawanna & Western has used concrete very extensively in a wide variety of structures within recent years. During the five years from 1907 to 1911, inclusive, 783,000 cu. yds. of concrete were placed on this road, 267,347 cu. yds. of which entered into structures on the Hopatcong-Slateford cutoff, described in the *Railway Age Gazette* of December 6, 1912,

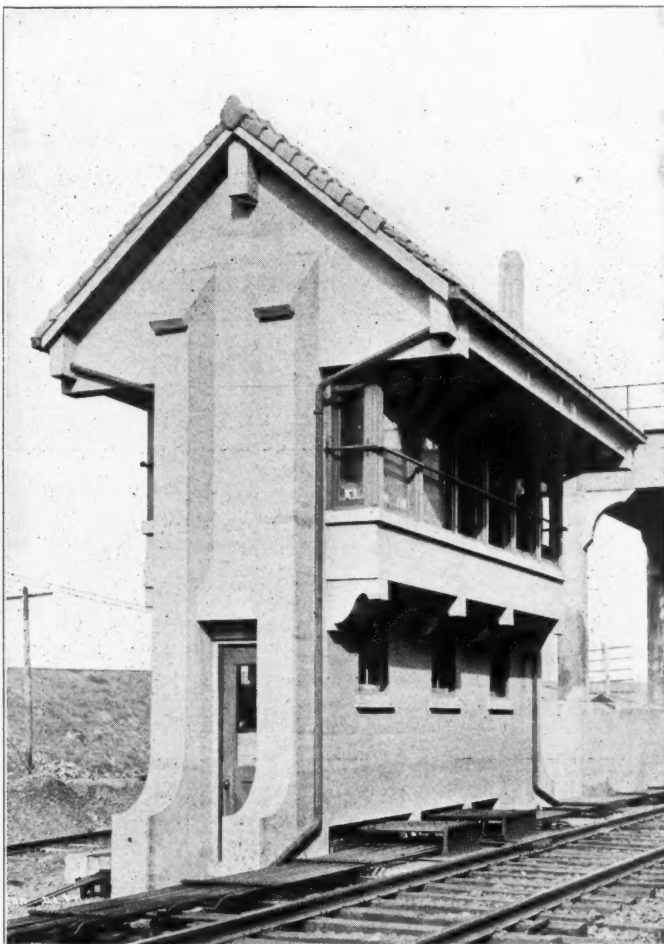
three signal towers being built entirely of this material on this one cutoff. One of these signal towers, located at Port Morris at the easterly end of the cutoff, is shown in one of the accom-



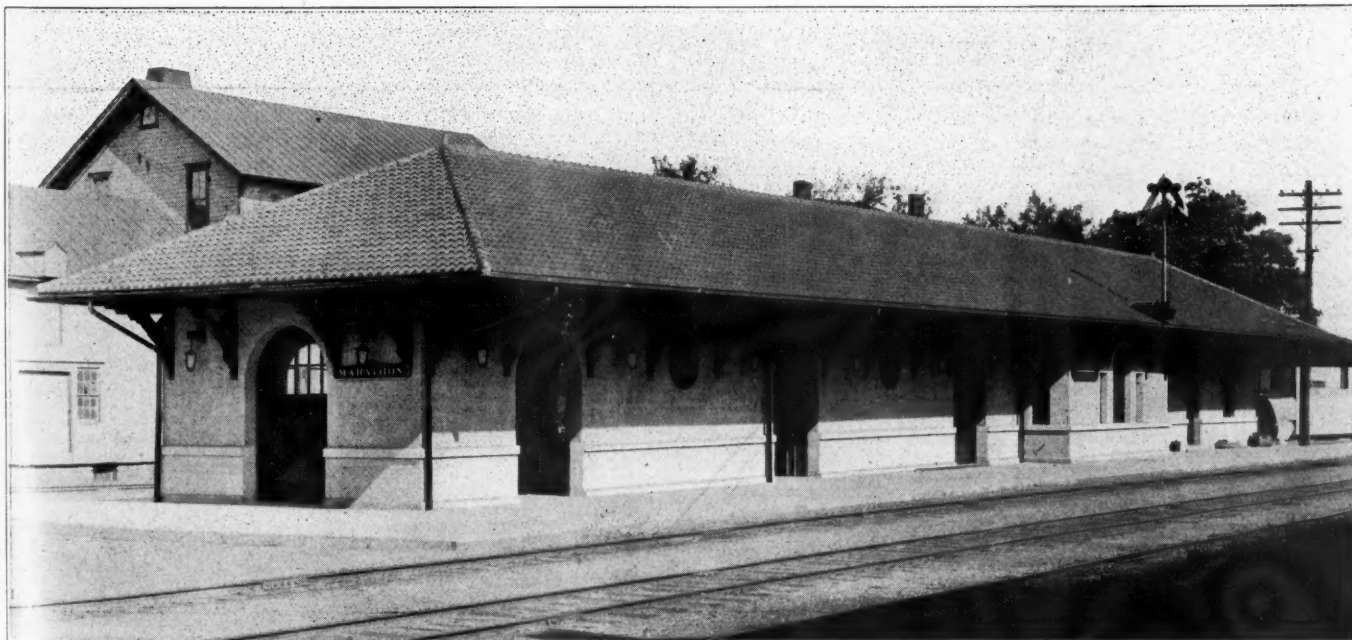
Standard Concrete Signal Tower at Port Morris, N. J.

and January 3, 1913. On this work concrete was used for every structure from the Pauline Kill viaduct down to the smallest culvert, even the fence posts being made of concrete.

An important application of this concrete work has been its adaptation to buildings, three new stations, a freight house and



Special Concrete Signal Tower at Kearney Junction, N. J.



Concrete Station at Marathon, N. Y.

panying photographs. The other two are identical in design, and this same design has also been used at a number of other points on the Lackawanna, varying the length of the building to suit the requirements of the interlocking machine. Up to this time 10 of these towers have been built and this design has

shown was therefore designed 6 ft. wide x 25 ft. 8 in. long on the first story and supported on a foundation box 18 ft. wide x 27 ft. 2 in. long, carried on piles below tide level. The second floor is extended out to a width of 10 ft. 3 in. over the bays, which are supported on brackets cantilevered out from the walls



Concrete Station at Pocono Summit, N. J.

come to be considered a standard where concrete signal towers are desired on this road.

There are, however, situations where this design could not be employed, as illustrated by the photograph of the tower at the Pennsylvania overhead crossing near Kearney Junction, N. J. At this point it was necessary to place the tower between tracks and a width of only 6 ft. was permissible at the base. The tower

below. The roof is 18 ft. wide over the eaves and is entirely supported on girders resting on the end buttresses which swell out at the bottom, giving the entire structure an appearance of stability.

Up to the present time seven all concrete stations have been built while four others have been built of solid concrete up to the window sills with stucco above, giving the appearance of a



Novel Station of Concrete and Cobble Stones at Lake Hopatcong, N. J.

concrete structure. A number of others have been built of brick with concrete trimmings, which also give very pleasing effects, an instance of this latter design being the Montclair, N. J., station described in the *Railway Age Gazette* of July 4, 1913.

With the stations it has not been possible, nor architecturally

the local conditions and the topography have governed the design and have assisted in the development of unusual and pleasing stations.

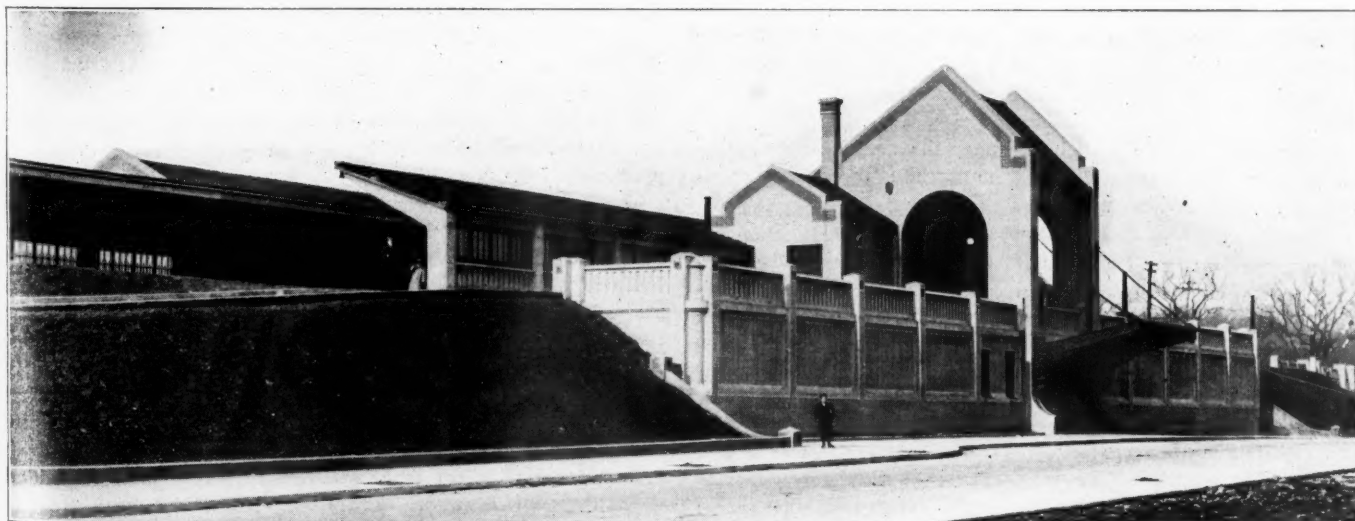
At Lake Hopatcong, for instance, a high embankment on the town side of the track was used as a support for an overhead



Brick Station with Concrete Trimmings at Watsessing Ave., N. J., Showing Concrete Cantilevered Canopies.

desirable to follow the same design to any extent. In some instances where the requirements have been practically the same it has been possible to secure pleasing effects by simply varying the style of design slightly, as can be noted by a comparison of the stations at Marathon and Pocono Summit. At other points

crossing of the tracks. As shown in the photograph, the station itself, which is of cobblestones with concrete trimmings, was located on a high embankment with a stairway descending to the adjacent track and with a concrete structure extending across the tracks to a platform on the opposite side. Elevators



New Station at Bloomfield, N. J., with Port Cochere on Town Side and Main Station Across the Tracks.

are provided over each platform for the handling of baggage and express.

At Watsessing avenue on the Mt. Clair branch a different problem was presented. Here the station was located in a thickly built up portion of the city and the company owned limited right of way. At this point in connection with changes in grade the tracks were depressed below the street level. The station was then located directly above the tracks and with a platform in front was supported on reinforced concrete ribs, giving it an arch effect and combining in one the two stations which would otherwise have been necessary. While the station building itself is of brick, an unusual and interesting feature of the construction is that of the concrete canopies over the platform. These canopies were cantilevered out from the retaining walls, eliminating any posts in the platform and were designed so that it was not necessary to increase the dimensions of the retaining wall in any way to provide for this increased load.

The station at Bloomfield, N. J., presented still another problem. Although practically all of the business was done on the eastbound side of the track and it was necessary for the station proper to be placed on that side, the town lay on the opposite side of the track and the people demanded that this building present an attractive appearance from that side. This condition was met by the construction of a small but attractive building on the north side of the track with a porte-cochere, as shown in the photograph, while ticket offices and waiting room were built on the opposite side.

Wherever concrete has been used in either passenger stations or signal towers an effort has been made to produce pleasing color effects and texture of surface by proper selection of materials and by removing the cement from the surface to expose the aggregates to view. This has been accomplished either by the removal of the forms shortly after the concrete has been poured and scrubbing the surface or by tooling it with regulation stone cutter's tools. Where scrubbing has been resorted to this has been done with a liberal application of water and vigorous scrubbing with stiff brooms or wire brushes, depending on the hardness of the surface. Great care must be exercised when using this method to preserve the arises. When stone cutter's tools are used, less care is necessary with the finish of arises, as the concrete is permitted to become considerably harder before the work is started. With this method it is also possible to vary the finish by leaving margins and either rubbing these with concrete stone or lightly bush hammering or tooth chiselling. The surface can either be bull pointed, crandelled or treated in such other manner as best pleases the designer.

This surface treatment has proved highly satisfactory, as it prevents unsightly surface checks, and at the same time gives a pleasing texture and color as well as an honest exposition of the materials of which the building is composed. To further increase the beauty of the structures and to give additional color to the surface, art tiles have been introduced in some instances, as shown in the photographs of Pocono Summit and Bloomfield.

These stations have been built under the general direction of G. J. Ray, chief engineer, and under the direct charge of Frank J. Nies, architect.

IMPROVEMENTS TO JAPANESE RAILWAY STATIONS.—The Japanese government railway bureau contemplates expending \$196,000 in improving the Shimonoseki railway station. After the wharf now building is completed the present station will be so extended that the connection between the land and sea transportation depots will be more convenient and up to date. For this \$78,600 will be spent this year in building locomotive round-houses. The balance of the \$196,000 will be spent over a period of four years. The railway station at Wakamatsu will also undergo extensive improvements, at a cost of \$1,485,000, to be extended over a period of four years.

ACTION OF ALKALI AND SEA WATER ON CEMENTS.

Because of the various conflicting ideas which have been presented from time to time regarding the action of alkali water and sea water on cements, the United States Bureau of Standards has investigated this subject and has published the results of its investigations in bulletin No. 12 by P. H. Bates, chemist; A. J. Phillips, assistant chemist, and Rudolph J. Wig, associate engineer physicist. Since the physical test covered a period of exposure of not to exceed $3\frac{1}{2}$ years, the following conclusions drawn should be considered somewhat tentative.

Portland cement mortar or concrete, if porous, can be disintegrated by the mechanical forces exerted by the crystallization of almost any salt in its pores, if a sufficient amount of it is permitted to accumulate and a rapid formation of crystals is brought about by drying; and as larger crystals are formed by slow crystallization, there would be obtained the same results on a larger scale, but in greater time if slow drying were had. Porous stone, brick and other structural materials are disintegrated in the same manner. Therefore, in alkali regions where a concentration of salts is possible, a dense non-porous surface is essential.

While in the laboratory a hydraulic cement is readily decomposed if intimately exposed to the chemical action of various sulphate and chloride solutions, field inspection indicates that in service these reactions are much retarded if not entirely suspended in most cases, due probably to the carbonization of the lime of the cement near the surface or the formation of an impervious skin or protective coating by saline deposits.

Properly made Portland cement concrete, when totally immersed, is apparently not subject to decomposition by the chemical action of sea water.

It is not yet possible to state whether the resistance of cements to chemical disintegration by sea water is due to the superficial formation of an impervious skin or coating, which is subsequently assisted by the deposition of shells and moss forming a protective coating, or by the chemical reaction of the sea salts with the cement forming a more stable compound without disintegration of the concrete, or by a combination of both of these phenomena.

Marine construction, in so far as the concrete placed below the surface of the water is concerned, would appear to be a problem of method rather than materials, as the concrete sets and permanently hardens as satisfactorily in sea water as in fresh water or in the atmosphere, if it can be placed in the forms without undue exposure to the sea water while being deposited.

Contrary to the opinion of many, there is no apparent relation between the chemical composition of a cement and the rapidity with which it reacts with sea water when brought into intimate contact.

In the presence of sea water or similar sulphate-chloride solutions, the most soluble element of the cement is the lime. If the lime of the cement is carbonated it is practically insoluble. The quantity of alumina, iron or silica present in the cement does not affect its solubility. The magnesia present in the cement is practically inert.

The change which takes place in sea water when brought into intimate contact with the cement is as follows: The magnesia is precipitated from the sea water in direct proportion to the solubility of the lime of the cement. The sulphates are the most active constituents of the sea water, and are taken up by the cement. Their action is accelerated in the presence of chlorides. No definite sulphate compound was established. The quantity of chlorine and sodium taken up by the cement is so small that no statement can be made as to the existence of any definite chloride or sodium compound formed with the cement.

Metal reinforcement is not subject to corrosion if embedded to a depth of 2 in. or more from the surface of well-made concrete.

THE ROADMASTERS' ANNUAL CONVENTION.

Report of the Thirty-First Annual Meeting of the Roadmasters' and Maintenance of Way Association. Held at Chicago.

The thirty-first annual convention of the Roadmasters' and Maintenance of Way Association was held at the Auditorium hotel, Chicago, on September 9-12 inclusive. This convention exceeded any previous convention in point of attendance of members, in the more general discussion and in the number and character of the exhibits of the Track Supply Association. The report of the secretary showed 134 new members and a total membership of 750, of whom 239 representing 73 different roads registered. The financial condition was equally good, the treasurer's report showing a balance of \$1,370 in the treasury. One interesting feature of the opening session was the presence of six past presidents on the platform at one time, namely, J. M. Meade (A. T. & S. F.), J. A. Kerwin (Erie), A. E. Hansen (A. T. & S. F.), James Sweeney (C. & E. I.), T. Thompson (A. T. & S. F.) and A. M. Clough (N. Y. C. & H. R.). The officers of the association for the past year were: President, W. Shea, roadmaster, C. M. & St. P., Ottumwa, Iowa; first vice-president, T. F. Donahoe, general roadmaster, B. & O., Pittsburgh, Pa.; second vice-president, W. R. Thompson, roadmaster, C. of G., Macon, Ga.; secretary and treasurer, L. C. Ryan, roadmaster, C. & N. W., Sterling, Ill.

The convention was opened on Tuesday morning with prayer by Rev. W. E. Hopper. Mr. Ross, representing the Mayor, welcomed the convention to Chicago, and W. H. Penfield, assistant to the vice-president of the Chicago, Milwaukee & St. Paul, welcomed the association on behalf of the railways of Chicago. In his opening remarks President Shea called attention to the unusual amount of emergency work which fell to the lot of the roadmasters the past year as a result of the widespread floods last spring. He also urged the co-operation of all members in taking part in the discussion and in assisting in reaching conclusions which would go out as truly representative of this association.

ACCIDENTS, PERSONAL AND OTHERWISE VIEWED FROM A MAINTENANCE STANDPOINT.

The maintenance of way department of a railroad is, of course, most interested in accidents attributed to defects in maintenance of way standards and roadmasters, most particularly, in accidents resulting from defects in road bed.

From the latest reports obtainable from the Interstate Commerce Commission, the second quarter of 1912, in which only accidents resulting in property losses of over \$150, whether attended by personal injury or otherwise, are included, we find that out of a total of 3,398 accidents reported, only 503 were due to track defects. This we can consider remarkable when we observe that the track and road bed are subjected to never ending and sudden strains and shocks that no other feature of railroad equipment is subject to, and that it is being kept up by the poorest paid, most ignorant class of labor to be found anywhere in a railroad organization.

From this same source and for the same period, we learn that out of a total of 135 killed and 2,934 injured, 24 were killed and 682 injured in accidents arising from track defects.

In view of the special efforts and the large sums of money being spent by railroads to prevent personal injuries and accidents and the attention being given this feature of the subject by men who have specialized in this class of work, the committee does not feel that much has been left undone for it to consider. We are in hearty sympathy with the Safety First movement, and feel that much good can be accomplished.

Referring again to the Interstate Commerce Commission report, we find that out of the 503 accidents attributable to defects of roadway, 45 were attributed to broken rails, 51 to spreading rails, 113 to soft track, 10 to bad ties, 10 to sun kinks, 182 to irregular track, by which we assume is meant bad line, sur-

face or gage, and 92 to miscellaneous causes, including defective switches, frogs, guard rails, crossing plank, etc. During the same three-month period there were 1,145 accidents due to collisions of various kinds, and 1,032 due to defects in equipment. A comparison of these figures should tend to keep our spirits up and cause even greater effort on our part for a better showing.

The elimination of spreading rails, to which 51 accidents were attributed in a three-month period, rests almost entirely in our own hands

Soft track, the most prolific source of accidents charged to roadway, calls for heroic treatment by the man on the ground, and can be attributed in most instances to the lack of, or the poor quality of, ballast furnished.

Bad ties caused 10 accidents. The committee does not feel that present day conditions justify accidents arising from this source. Watchfulness on the part of the roadmaster to see that the foremen exercise good judgment and watchfulness in taking out ties should eliminate this trouble entirely. It is true that a section may be short of help for a season, but we do not feel that any foreman or roadmaster should permit a tie condition that would result in an accident of sufficient importance to be included in this report. We shall not attempt to analyze the 182 accidents classified under irregular track except to impress on our superiors the necessity for sufficient and competent help. If we can succeed in getting good rail, ballast and ties, then it is a question of help. Along this line we might say that more help in a supervisory capacity would result in bigger returns in the long run than would the putting on of additional traveling passenger or freight agents. We do not think that it is fair or good policy to place a roadmaster in charge of a long division with a poor train schedule and expect him to keep in touch with all the details of the work, including coaching and examination of foremen. It is to be deplored that foremen do not get more coaching and more frequent examinations regarding their qualifications.

In 92 cases of accidents classified as miscellaneous we can only recommend eternal watchfulness, good judgment and prompt action. See that switches and all connections are in good condition by frequent inspections, that guard rails are kept as specified and frogs not allowed to pass the limit of safety as regards wear, while at the same time making sure that such material has been used to the fullest limit permissible to a safe track.

Committee: J. R. Coulston, chairman, L. E. & W.; C. J. Coon, N. Y. C. & H. R.; J. J. Hughes, T. R. R. of St. L.; H. Ferguson, G. T.; D. E. Lynch, C. B. & Q.; G. D. Gifford, N. Y. C. & H. R.; F. Button, C. & N. W.; T. H. Gaffney, M. P.

DISCUSSION.

The discussion divided itself into general comments regarding the safety first movement, including the beneficial effects of co-operation of all departments in preventing injuries to men and in means of removing the causes of accidents referred to in the Interstate Commerce Commission reports as attributable to defects of roadway. In the more general discussion A. M. Clough (N. Y. C. & H. R.) commended that part of the report advocating "safety first rather than safety last" and called attention to the fact that track forces had been carefully trained to avoid injuries in connection with their work long before safety campaigns were started, the track department being well in advance of other departments in this regard. At the present time the track department is called upon to pick up refuse, coal, parts of cars and other material thrown out along the track by employees of the mechanical, transportation and other departments. Instances were cited of drawbars thrown between the tracks and creat-

ing a dangerous condition when they could have been thrown outside the tracks equally as well. Mr. Clough advocated bringing such practices to the attention of the proper officers for the reason that the "Safety First" movement is not at present bringing all the beneficial results possible.

Mr. Burke (C. M. & St. P.) urged co-operation in the promotion of the safety first idea so that instead of throwing all work on the track department each department would endeavor to eliminate its own dangers instead of creating them. At present the section foreman is held to blame for an injury resulting from a drawbar lying along the track even though he may not have been on that portion of his section since the drawbar was thrown out by the train crew.

A. A. Wells (Southern) spoke of the influence of high speed of trains on the number of injuries resulting from derailments and stated that not over 10 per cent. of the personal injuries on his territory were suffered by men at work. T. F. Donahoe (B. & O.) stated that care must be used in relying upon speedometers upon locomotives in checking accidents due to speed, as such records have been found at times to be inaccurate. He cautioned against an engineer watching his speed recorder too closely, as it introduces an element of danger in drawing his attention from the track and signals.

In discussing the means within the power of the track department for reducing accidents due to defects in roadway and structures, several spoke of the importance of seeing that the rail has uniform bearing as a means of preventing broken rails. M. Burke (C. M. & St. P.) advocated that especially in busy terminals only sufficient work be undertaken each day as could be completed and all material picked up before night. He also advocated the use of safety switchstands on all facing point switches not interlocked and urged the most careful inspection of switches that lost motion be not allowed to develop and that they be kept in accurate adjustment. L. C. Ryan (C. & N. W.) said that as one means of promoting safety his road is now buying frogs and guard rails already blocked; also all rail is handled by mechanical unloaders except in cases of emergency. He emphasized the importance of the roadmasters seeing that rules are followed out by their foremen and workmen and urged that they investigate why the rules are frequently disregarded. As a means of securing obedience to rules he advocated paying section foremen a sufficient wage to make their jobs attractive to them, so that they would endeavor to hold them. W. H. Kofmehl (C. M. & St. P.) told of the employment of additional track walkers last winter when encountering considerable difficulty with broken rails. He used night track walkers on many sections, in some instances placing three on a single section. Trains were followed over the line to endeavor to detect the cause of this trouble and it was finally located in two locomotives.

In discussing spread track the consensus of opinion was that with proper materials, supervision and labor, such a condition should not exist. A more liberal use of tieplates on tangents as well as on curves was advocated as a means of preventing this trouble. Some members advocated tieplating opposite the joints where it was impossible to secure sufficient plates to tieplate solidly. A number advocated tieplating, solidly, if at all, to prevent damage to rail due to surface bending, but others did not see the necessity of this if the track was surfaced at the time the plates were applied.

CONTRACTING MAINTENANCE WORK.

As this is a new subject it is almost impossible to present figures of the cost of contracting work in the track department under traffic. The committee has not been able to find any road on which this has been given a test.

The St. Louis division of the Big Four has placed stone ballast under track at an average cost of 27 cents per track foot after the stone was unloaded. This was an 8 in. average raise and included tie renewals, dressing and filling. American hobo

laborers used on this work received \$1.75 per day, the foreman \$75 per month, the assistant foreman \$60 per month, and the time keeper \$60 per month. On one division of the New York Central it cost four cents per track foot to lay rails under heavy traffic, not including the unloading of new or picking up of old rail. We have not heard of rail being laid under contract. One road reports that it cost two cents per plate to put on tie plates with foreign labor, including adzing ties, plugging old holes, respiking and gaging. We believe this could be done at less expense if good American labor had been employed.

Your committee has a report on the contracting of the mowing of right of way on one division at a cost of from \$5 to \$20 per mile, where it cost from \$10 to \$30 per mile to do it with section men. This was done under the supervision of the section foreman and with the approval of the supervisor. We also have a report from one road which did standard banking through a level prairie country by hand by section labor at a cost of \$1.50 per track rod. The laborers were foreigners and were paid \$1.60 per day. In the same territory the same kind of work was let by contract at \$1 per track rod. The contractor paid his laborers \$2 per day, and made an average of \$16 per day working 15 men daily. This work was done under the supervision of a section foreman, who took charge both of his regular section work and of this extra contract. We also have a report of tile ditching being done by contract at a saving of from 20 to 30 per cent.

We find that of late years most roads have either been doing all their new track work by contract or under a construction department. In some cases we find this has been satisfactory and in some cases it has not. We are, however, unable to state which proved the cheaper.

It is a fact that contractors pay more money to their men for the same kind of work than the railroads, and they get better men and can do the work cheaper. In addition, a contractor is always equipped with the latest labor saving devices which is not always the case in the track department.

No maintenance work should be contracted without the strictest provision in the contract that it must be approved by the proper department and a competent man provided by the railroad company as an inspector.

Some of the reasons why contract work, so far as it has been tried, is cheaper than that done by section labor may be enumerated:

- a. A contractor can pay his men what they are worth to him.
- b. A contractor always has a following of expert laborers.
- c. A contractor can fortify himself against all conditions, can have his own boarding outfit and can supply his men with better accommodations than a railroad company.
- d. Laborers understand that when they work for a contractor they have to do their part of the work or drop back to less pay or lose their place entirely.
- e. By contracting some of the heavy track work the supervisor or roadmaster would have more time to devote to his regular work, which is an important consideration. It costs much less money to keep track in condition after it has once been brought up to standard than to build it up again after months of neglect and lack of supervision which usually results when the roadmaster is compelled to take charge of new steel or ballast work.
- f. The rate of pay for all work done by the companies is based on what we call a standard one rate pay for regular laborers and another rate for extra gang laborers. The poor laborer receives as much as the competent man no matter what the conditions are. The consequence is that we have a gang of men of an inferior class. The roadmaster in charge cannot change their wages, and by the time he has been able to convince the higher officials that he can make a considerable saving by raising wages, the season is too far advanced. The contractor avoids all this, as he is on the ground, in a position to see conditions as they actually are, and in consequence he fixes

his scale of wages according to the supply of laborers and their worth.

Committee: John Barth, chairman, Big Four; James Burke, Erie; T. Hickey, M. C.; Guy Lowers, Erie; P. Madden, C. M. & St. P.; N. McNabb, M. C.; F. E. Crabbs, C. & N. W.

DISCUSSION.

Although the committee did not divide its report, President Shea suggested that the discussion be divided in two portions, one the contracting of work not interfering with or affected by train movements, and the other that in which there was more or less interference with traffic. In discussing the contracting of work which is not affected in any way by traffic, A. A. Wells (Southern) has found that the building of fences can be done cheaper by contract and believed that the loading and unloading of ties and the mowing of right of way could also be done cheaper in this way.

H. Van Gorter (C. & N. W.) has contracted the rebuilding of fence for 20 cents per rod. This fence is built with posts 16 ft. apart with one intermediate stay. Old posts were split up for stays, as they were found more satisfactory than the 1 in. by 3 in. hemlock strips generally furnished. He also found that the loading of new ties by contract was cheaper, although he preferred mowing the right of way with company forces, as he secured more satisfactory work.

I. C. Ellison (St. L. I. M. & S.) reported that in contracting the crushing of large quantities of stone for ballast he found that while there was probably no difference in cost between company and contract work, he had difficulty in having the stone crushed to the proper sizes and in keeping out screenings. He also contracted the maintenance of switch lights, but did not recommend this, for he found that although cheaper, the lights were poorly maintained.

A. E. Hansen (A. T. & S. F.) reported building much fence by contract for several years at a cost of from 16 to 20 cents per rod. This year he is building 138 miles of fence with company forces at a cost of 17 cents per rod and is getting much better fence than before, especially with reference to braced corner and end posts. In this work he is paying the same wages usually paid by contractors, which is considerably above the average rate paid by railways, and is getting his pick of the men.

J. P. Corcoran (C. & A.) has contracted the mowing of right of way this year by machine for \$9 per mile. In previous years mowing by hand has cost \$25. He also contracted the cleaning of stockyards three years ago for 28 cents per car, which contract has since been canceled. He is now cleaning these cars with company forces at a cost of 16 cents per car in summer and from 60 to 80 cents per car in winter. A regular gang is assigned to this work and clean from 75 to 100 cars daily. Such time as the gang is not required in cleaning cars is employed in levelling down the bank, the cost of this work not being included in either of the above figures.

J. M. Meade (A. T. & S. F.) stated that tiling is now being generally contracted on the Santa Fe at an average cost of about 16 cents per lineal foot in earth cuts. A vitrified bell end tile generally 6 in. in diameter is laid. He also contracts much bank widening by teams at a cost of from 16 to 20 cents for earth, allowing classification for rock. Bank widening is done in this manner almost exclusively on three divisions.

J. Barth (C. C. C. & St. L.) found that he can mow right of way by contract from 10 to 30 per cent. cheaper than with company forces, by letting this work out to farmers along the line, who take contracts of from one to ten miles to mow during their dull season. Even if the railway company furnished all tools and mowing machines he believed that the work could be contracted cheaper under these conditions.

In discussing the contracting of work affecting the movement of trains, D. Foley (M. C.) stated that he is now laying rail and putting stone ballast under track by contract. In ballasting the railway company furnishes a foreman and all

tools. One gang skeletons the track at a unit price per lineal foot. Following this gang is another one spacing ties and paid by the day. A third gang spends one day putting the stone under track, resurfacing the second, and trimming and lining the track the third day. The company keeps a general inspector on the ground, while the roadmaster makes the final inspection of track before the work is accepted. In laying rail the company distributes its own material and picks up the rail released, while the inspector lays the new rail and breaks the bolts. The contractor lays all switches on his work and does all drilling in connection therewith. The company does not maintain an inspector in connection with the rail laying, but the work is in charge of an experienced foreman who formerly worked for the company. For this reason the quality of work is practically the same, but the duties of the roadmaster are not materially decreased by contract work. Mr. Foley did not believe that the contractor was doing any more work than the company formerly did. The contractor pays the foreman more than that paid by the railway company. In reply to a question Mr. Foley stated that he did not know who would be held responsible in case of an accident.

J. O'Connor (M. St. P. & S. S. M.) tried surfacing track by contract several years ago and found it a failure. Although a competent inspector was employed by the railway company, it was not possible to secure good work. He reported an experience in connection with the contracting and laying of 200 miles of 80-lb. rail several years ago at a contract price considerably below that of company work. The company placed an inspector on the work who kept a record of the actual cost to the contractor. After laying 10 miles at a cost considerably in excess of the contract price and above that of previous company work the contractor gave up the contract. As a result of these experiences he strongly opposed contracting work of this nature.

I. C. Ellison (St. L. I. M. & S.) stated that the Missouri Pacific system has recently completed about 1,000 miles of ballasting by contract. On his division this work was done at a unit price of 80 cents per cu. yd. for loading, unloading and putting gravel under the track. An additional price of 15 cents per tie was paid for all ties renewed. The company placed an inspector, usually a young engineer, on the ground. This method of ballasting was generally unsatisfactory, as it was impossible to get the contractor to tamp the ties satisfactorily, and as he had his own work trains, he frequently delayed traffic. Similar work has recently been done with company forces at a cost slightly below the contract price and with much better work. The contractor paid his foreman \$80 to \$100 per month, and the laborers from \$1.50 to \$2 per day. On similar work the company this year paid foremen \$55 to \$75 and laborers \$1.25 to \$1.50.

COMBINED ORGANIZATION OF MAINTENANCE FORCES.

On account of the unnecessary time lost in moving small repair gangs of the signal, bridge and building departments or even the mechanical department over the road it has frequently been advocated that, by raising the standard of our present track forces, much time and money can be saved by the railroads of this country.

For instance, an agent wires he has three or four broken panes of glass to be replaced at his station and gives the dimensions. The glass is forwarded and a man is sent out to make the repairs. His train leaves the terminal at 9 A. M. and arrives at his destination at 11 o'clock. He finds that two of the lights fit, while the other is off-size a slight amount, necessitating his waiting for another glass and very likely, his returning to headquarters for it, and another trip to the town next day.

A conductor sets out a bad order car at some small station and leaves a description of the defects with the operator, who, in turn, notifies the proper department. It very often develops that the information is in error, and a second trip is necessary.

Dozen of similar cases have led many operating men to be-

lieve these minor repairs can be taken care of by the men on the ground. Just how, seems to be the only obstacle confronting them. Perhaps most of us will favor the idea of paying one man in a section gang a rate sufficient to secure a good reliable man who can look after such work. Such a man may or may not be required at each section, this depending upon the importance of the station or section.

Another idea advanced by some is to allow each section enough men at the advanced wage to take care of the winter section force. This will be an incentive for the laborers at ordinary wage to try to obtain the steady job and higher rate.

For the officers of such an organization, we necessarily will need well balanced, all around men. Such men, however, should not be hard to secure, especially after a few years of operating with the higher class of section men who will have developed into good foremen and roadmasters.

On account of the necessary requirements, the head of the maintenance department will necessarily be a more lucrative position than that of our present day roadmaster or supervisor and still at the same time the supply will necessarily have to be drawn from the track department.

Some roads have taken steps to combine their maintenance forces, the track and signal forces being the ones most generally considered. It is reported that while some roads favor the combination others do not. One middle west road tried this plan this season and has now abandoned it entirely, as it was found the track condition depreciated while the cost remained as great or greater than before the signals were taken over.

This committee as a whole does not favor any further duties being imposed upon us for fear our roads will not allow the necessary compensations to make it a success.

Committee: Emmett Keough, chairman, C. B. & Q.; A. E. Hansen, A. T. & S. F.; B. C. Dougherty, C. M. & St. P.; P. J. McAndrews, C. & N. W.; F. B. Adams, P. & R.; C. Linehan, C. R. I. & P.; E. J. Boland, I. C.

DISCUSSION.

A. A. Wells (Southern) stated that section forces on his division handled minor repairs to pumping plants without difficulty. W. R. Thompson (C. of Ga.) said that on his road the section foremen make repairs to telegraph lines after storms to the extent of putting in poles, etc. The roadmaster has charge of everything on the right of way except steel bridges, as on the Southern. N. McNabb (M. C.) protested against adding more work to the track forces, as he feared that the track would be neglected as a result.

J. P. Corcoran (C. & A.) described the experiment of the Alton with the combining of signal and track maintenance which was tried for two months and recently abandoned. He stated that it was found that the track work was neglected for the signals, as it was difficult to make signal maintainers of the track men, and they had difficulty in locating trouble. The method in use on 300 miles of the main line of the Union Pacific with combined track and signal maintenance and the satisfactory results secured by this method in the three years this has been on trial were described in some detail.

J. Burke (Erie), advocated the combined system on the ground that foremen are secured from the same class of men as maintainers. The wages of section foremen should be increased so as to draw this material from which maintainers are created into the track forces. He believed the tendency to combine forces on the track was in accordance with the same tendency in offices, etc.

J. Buel (Ark. Cent.) described the combined maintenance organizations in effect on his road where the maintenance of bridges, water stations, telegraph lines, buildings, etc., are under the supervision of the roadmaster, and stated this plan worked out satisfactorily.

NEW APPLIANCES.

Manganese Steel.—There is no question but that the application of manganese steel will prolong the life of frogs and crossings, but in making comparisons it is unfair to lose sight of the

fact that improvements in the design of built up rail crossings and in the rail itself have also been made. Instances have been reported where the results obtained with manganese construction have so far excelled previous records that there seems to be no question as to its superiority over frogs and crossings made of ordinary steel. It has been frequently asserted that where an ordinary frog has a life of from two to five months, a frog with manganese inserts, in the same location, has lasted from one to two years and probably was still in service at that time. Likewise crossings that give all the way from five to fifteen times the service of ordinary rail when made of manganese.

While these tests may apply to rare cases they do not prove that the results will be the same when used in greater quantities, for the failures, as well as the successes, must be taken into account in judging of the true economy of any material. Manganese steel, as generally used in track work, is a cast product and differs from ordinary cast steel in that a small per cent. of manganese is put into the cast steel before molding. By undergoing a heat treatment it is given the tough qualities that make it so desirable in track work.

It is an evident fact that it is very much more difficult to obtain perfect castings where the size is as great as a complete railroad crossing, or even half of the crossing, or where crossing frogs are required in lengths longer than 11 ft. While perfect castings of extreme size and length have, no doubt, been made there is, in our opinion, a very good chance of getting more bad castings than good ones. For manganese crossings and frogs to give the best service the casting must, of course, be perfect. One blow-hole, crack, or flaw may cause a complete failure in a very short time after the casting is put into service.

It is our opinion that if crossings and frogs cast of manganese steel could be made of greater height than our ordinary 80 lb. to 100 lb. "T" rail, they would give better service and not be so liable to crack and break. As this cannot well be done in a great many instances on account of the crossing lying on the portion of the tie that goes under the ordinary "T" rail, we would recommend, to overcome this, that the running rails of the crossing be made heavier.

Poor design and the skimping of weights to reduce cost have been the cause of many failures in crossings. Solid frogs have likewise been unsuccessful when cast with long arms to meet existing rail closures. There is no doubt that we have in manganese steel a metal that adapts itself particularly to this class of work on account of its resistance to wear, its toughness, and the fact that it may be readily cast to the forms of track construction, and we should use this material in such a way that these advantages are not dissipated by improper design and application.

We are inclined to recommend the insert frog in preference to the solid frog or crossing unless a crossing is made of four pieces 11 ft. long. The hard center, or manganese insert type of frog or crossing must, of course, be made up carefully so that the manganese steel part of the frog or crossing that is subjected to the wheel blow and the connection between the manganese casting and the rolled rail are of sufficient strength and permanence to avoid excessive maintenance.

We would recommend that in all cases where manganese steel inserts are used in crossings the running rail be made full size in all cases where it is possible to do so and square at the ends abutting the manganese portion; this in order that in case of rail failures repair gangs can take a piece of rail of the same section, cut it off square at the end, bore the holes in the proper place in the rail, insert the running rail and repair the crossing in a short time, while if the ends of the rail abutting the manganese steel are made with mitered corners and the flanges and heads planed, or ground off, the crossing would have to be taken out of service and scraped or sent back to the frog shop for repairs.

Tie Plates.—Tie plates were first adopted for the protection of the tie. However, they are now designed also to resist the

lateral thrust of the wheel flange and to hold the track to gage. We believe that it has been the general experience of roadmasters that smooth bottom tie plates do not present any great resistance to track spreading, because the only added power given to this plate is the holding power of the inside spikes. Preference should be given to such tie plates as do in themselves present resistance to track spreading, if at the same time the bottom design is not such as to work injury to the tie. For this reason, we believe, that a shallow corrugation on the bottom is the best design of a tie plate. This type of tie plate is made in various designs, some with two to four ribs on the bottom running in the direction of the grain of the tie when it is applied, some with two to four ribs running transversely across the bottom or across the grain of the tie, and still others with the corrugations running diagonally across the bottom of the tie plate in both directions. We believe it is the experience of the roadmasters who have used this last-mentioned design of plate, that it best holds the track to gage, as when the plate is seated on the tie it cannot move in any direction. This type of plate is easy to apply, will rapidly seat itself and does not cut or tear the fibers of the tie. Also on account of its form it will to a considerable extent prevent water getting under the tie and rotting it.

Tie plates are being manufactured from malleable iron, wrought iron and steel. In comparing these articles, we believe that wrought iron is the best material. Both wrought iron and malleable iron resist corrosion much better than steel. Wrought iron plates of the proper design cannot be broken, while plates of steel or malleable iron are frequently broken under traffic, the break generally being along the shoulder.

We believe that special attention should be given to the method in which tie plates are rolled. It has been found that wrought iron tie plates which are rolled with the fiber running in the same direction as the rail will break very easily. This also applies to steel tie plates which are rolled in the same manner. Wrought iron and steel tie plates rolled with the fiber running at right angles to the rail do not break in service.

One Piece Guard Rails.—Next to a frog in importance both for strength, durability and easy application, we recommend a one piece guard rail with braces, tie plates, and fillers made of manganese steel.

An Improved Track Drill.—Perhaps no track appliance that we are of necessity obliged to use can cause more trouble than a poorly constructed or worn out track drill, especially in large yards or where yard construction is going on. We all know what is meant in days gone by to get the butt of the drill out, if one broke that was secured in the socket by a set screw.

We now have an automatic chuck, self-acting track drill with ball bearing gears in which by the movement of a single lever, the drill will run forward or backward. It is a simple, strong and durable machine which we would recommend.

An Improved Insulated Joint.—An insulated rail joint with shoulder tie plate is a new feature in track insulation, as the plates that support the rail insulation are in direct contact with the base of the rail as with the regular joint. The fiber sheet between the plate and the rail is being entirely eliminated and is a long step towards making insulated joints easier to maintain.

Switch Stands.—The use of automatic safety switch stands with full adjustments, especially for yard use, is to be recommended. A safety automatic switch stand must be automatic under all conditions; that is, it must be automatic when latched and locked, and when operated by a train trailing through at high speed as well as at low speed. It is recommended that switch stands be provided with full adjustments, so that the stand once spiked down need not be moved on the ties.

Hard Center Spring Rail Frogs.—A hard center spring rail frog has recently been developed with the rigid wing point and filler all in one piece and with a manganese steel spring wing,

so that with the wear we get with the rigid hard center frog proportionate with what we get from a spring rail frog of the same material, we will have a very durable frog.

Targets for Switch Stands.—Targets of the interlocking type in enameled colors are recommended. This type of target cannot become loose or accidentally detached from the switch stand spindle. It slips over the top of the spindle, which is squared so that the target will always register at the proper angle to the track. This type of fastening does not injure the enamel.

A Steel Car Bunk.—We believe a solution of the bunk car problem has been found in the all steel bunk recently put on the market. They are built strong, thoroughly braced for double or single deck, are coated with a rust-proof black enamel, and apparently fill a long-felt want. We recommend their use.

Committee: W. H. Kofmehl, chairman, C. M. & St. P.; A. M. Clough, N. Y. C. & H. R.; G. H. Brooks, T. R. R. of St. L.; J. P. Corcoran, C. & A.; Wm. Hazelwood; W. H. Cleveland, A. T. & S. F.; G. M. Green.

DISCUSSION.

In the discussion of manganese steel for track work, numerous installations of frogs, crossings and switches were described where the increased first cost has been amply justified. Although an effort was made to draw out information concerning failures of manganese steel and the reasons for them, it was evident that while failures were reported those present knew little about the causes. After considerable discussion the association voted to recommend the use of manganese steel for frogs and crossings wherever the traffic was severe.

That part of the report on tie plates with reference to the design of the bottom of the plate aroused considerable discussion. Two men spoke of instances where track laid with screw spikes spread on curves because of the bottom being smooth, without any ribs. T. Thompson (A. T. & S. F.) referred to difficulty in holding track laid with flat bottom tie plates to gage on curves. On the other hand, President Shea stated that any bottom ridge on a tie plate would shorten the life of the tie, and if plates will not hold track to gage he recommended the use of rail braces.

The consensus of experience was that track laid solidly with tie plates would not require regaging except to take up the wear of the head of the rail, although several instances were recorded where track laid with tie plates had spread.

USE OF POWER DRIVEN AND LABOR SAVING APPLIANCES.

Section Motor Cars.—The use of section motor cars is considered by the committee an important development toward increase in efficiency. There have been diverging views existing among some railroad men concerning the advisability of installing motor cars on sections and, while their use may not be equally advantageous on all territories, it is evident to the committee, after careful investigation and actual experience in the use of these power driven cars, that there is absolutely no doubt of the economy and advantages in their use.

Where used, these cars have resulted in a substantial saving in track maintenance not only from the fact that a greater territory may be covered by the same number of men formerly employed on the hand car sections, but because experience shows that greater efficiency and longer hours of work are secured; the men reach their work in a condition ready for duty; the service of work trains has been dispensed with, to a great extent, in the distribution of material, moving gangs to and from distant points, and in collecting men quickly in emergency cases.

The power on these cars could also be made use of for such purposes as operating rail saws, drilling machines, putting in screw spikes, etc.

After becoming familiar with the motor car the foremen are

quick to recognize its merits and to give it their best support. Men are more readily secured on sections where these cars are operated. Light repairs to these cars can be readily made by the foremen, and it very rarely becomes necessary to shop the cars for repairs to the motor or parts. Their use may be abused, however, and excessive rate of speed and disregard of trains will sooner or later result in accidents and heavy repair cost. This difficulty is to be avoided by issuing and enforcing stringent rules as to the use and care of the cars.

The committee urges the adoption of motor section cars and recommends their general use, especially on portions of the road where the volume of traffic is not exceptionally heavy.

Rail Loaders.—A power driven machine designed to load or unload rails and other heavy material is now very essential and its use has proved its worth on account of its decided saving in labor, satisfactory manner of handling material without damage in an economical manner, and the increase in safety of operation.

Different rail loaders are used, although there appears to be no particular make in universal use and many railroads are still performing such work by hand labor. While on some roads an ordinary light steam derrick or crane is used to some extent, with satisfactory results, there is now on the market and in use by a number of roads, a rail loader, operated by compressed air, which has shown exceptional merit in the rapid handling of rail and other material. It is mounted on a covered flat car and consists of a detachable boom attached to a low mast and guyed to an adjustable "A" frame on each end of the car, which permits of the loading or unloading of two cars at the same time. The hoisting cables which run along the booms are attached to piston rods in the compressed air hoist cylinders which are on the floor of the car and connected with air reservoirs, air for this device being taken from the train line. A loader as above described with a force of nine men will load or unload rails at the rate of four per minute.

Stone Ballast Plow.—This machine, which is used for the purpose of loosening stone ballast in track centers preparatory to cleaning, will do the work of several hundred men with picks. It is permanently attached to a flat car and has rigid horizontal arms which may be extended from one end of the tie to the center line by air pressure. On these arms are carried plows which consist of tool steel spuds about 12 in. long, the section at the top being 3 in. across and 6 in. lengthwise with the track. The arms are raised and lowered by air pressure and are driven into the road bed to a depth of several inches below the bottom of the tie if desired. The plow is moved at a speed of from five to six miles per hour.

Other Operations Using Compressed Air for Power.—Where there is a supply of compressed air at hand it has been found to be very satisfactory and economical to use it in cleaning the iron work from bridges, also in cleaning the bridge seats. The ordinary pressure hose is used with a nozzle and thumb valve. By this method one man can clean a bridge as quickly and more satisfactorily than five or six men with brooms and brushes.

Pneumatic drills have been used to bore rails in track and around interlocking plants, and it has been found that two men in two days will accomplish as much of this work as four men with hand drills in four days.

Miscellaneous.—In applying bolts when renewing rail in main tracks, considerable time is gained by using short wrenches, about 8 inches long, by which a nut can be rapidly screwed up. These nuts are later tightened by men who follow with the long wrenches.

On stone ballast territory, canvas aprons are sometimes a part of the work train equipment and are used to cover the stone ballast shoulder when loading dirt from the ditch.

In distributing coal to stations a sectional chute about 24 ft. long, when extended, is very practical, and a considerable saving in labor over carrying coal in bags.

Committee: H. E. Astley, chairman, N. Y. N. H. & H.; Coleman King, L. I.; J. H. Angier, N. Y. C.; Z. B. Couch, L. & N.;

J. W. Fletcher, Jr., Chi. & N. W.; J. W. Powers, N. Y. C.; Robert Faries, Penn.

DISCUSSION.

Owing to lack of time this report was accepted without discussion.

BANQUET.

A banquet was tendered the roadmasters by the Track Supply Association on Thursday evening, about 300 attending. A. H. Weston, president of the Track Supply Association, acted as toastmaster.

W. L. Park, vice-president of the Illinois Central, addressed the men and laid special emphasis on the responsibility of the individual employees to the railways. While the cost of living is going up by leaps and bounds, we have the lowest freight rates of any country, and these rates are still being lowered. On the other hand, the cost of materials is rising. The roads in this country are being bettered in condition, but at a rapidly increasing expense."

Referring to the freak legislation, as he termed it, Mr. Park emphasized the importance of employees giving the railways their loyal support and co-operation, and stated that if each employee would make two friends for the railway each year railway bailing would soon stop. "The practical railroad men know the order in which there should come about a bettering of the physical conditions. If a wreck occurs through a collision the would-be regulators immediately propose a panacea in the abolishment of wooden cars, although they do not know as yet to what extent steel cars are preferable. If a flagman fails to do his duty, automatic signals are to be forced by law regardless of the fact that the road may not be paying dividends, and a maudlin public sentiment excuses the real culprit.

"If the block signals fail to stop an engine there is a hue and cry for automatic control, although such a device has not yet been invented and is considered by practical railroad men to be impossible, as the responsibility cannot be taken away from the engineer.

"Millions of dollars are being paid out in refinements of freight car equipment, such as a nice adjustment of the height of cars, wrought iron brake wheels that are never used, instead of cast iron, ladders on each corner of a car, and many other innovations that do not go very far to prevent personal injury. This money wasted in many directions through the interference of those who know little about the actual conditions on the railroads would provide real safety if the managers were permitted to spend it in the direction it should properly go.

"A railroad manager would be criminal to put money in expensive track elevation, separation of highway crossings, or steel cars if the railroad had only sand ballast, wooden bridges, inadequate drainage and protection against washouts, landslides, etc., items which are well known to practical operating officials as being those which should receive first consideration.

"The Pennsylvania railroad company has 75,492 shareholders, 48 per cent. of whom are women, and 12,634 own less than ten shares, the average holding being 120 shares. The New York Central lines have 20,944 shareholders, of whom 12,881 own less than 100 shares. The Santa Fe lists 32,000 shareholders, and the average stockholder owns eighty-nine shares. The Baltimore & Ohio stock is held by 10,436 individuals, 9,160 of whom own less than 100 shares. The Chicago & Northwestern is owned by 9,000 stockholders, 5,000 of whom own less than 100 shares. The Illinois Central has 10,196 stockholders—8,313 own less than 100 shares and 2,814 own less than ten shares.

"It is absurd to expect these stockholders to go without their dividends indefinitely to provide for betterment of the railroads from which they will not be permitted to obtain any additional returns. The greater part of them are poor people, who live on the income from their investment."

ECONOMIES OF TRACK LABOR.

H. R. Safford, chief engineer of the Grand Trunk, addressed the men on The Economics of Track Labor. He said in part as follows: The problems you face today in the work of building and maintaining track, roadway and structures are nearly all economic ones or at least have an economic side. We are and have been for the past ten years approaching a clearer comprehension of the fact that many of the problems which we have been trying to solve as simple ones of construction and maintenance are equally economic in nature. Labor, which constitutes such a great element in the construction and maintenance of track, is a commodity of fluctuating value and with no standard of efficiency. Its instability, as far as the laborer is concerned, is the great difficulty, and as it has not yet been demonstrated that a premium should be paid for skilled labor, the price paid follows the economic law of supply and demand, and it is purchased as coal, lumber, vegetables, etc., are purchased, that is to say, the price paid should not exceed that for which it can be obtained. I refer, of course, to the laborer only, not to foremen.

The economics of track labor may be generally divided as follows: 1. The study of organization as applied to the track department. 2. The study of the problems surrounding the employment and working conditions of track foremen and laborers. 3. The study of a means to determine efficiency. 4. The study of a means for raising such efficiency. 5. The study of a means for measuring and comparing conditions, so as to establish a method for economically and fairly regulating and making appropriations for expenditures.

I believe in speaking of organization we may truly say that as applied to railroad operation our methods are too traditional in many ways. They are methods which are not only time honored but in many instances time worn. Perhaps no general changes are proper, but can we speak positively as to this? I maintain that we cannot answer those questions positively, because we do not know. Can we say that some of our trouble now experienced is because the organization method is not proper and that they can be eliminated by changing it? We certainly cannot, but if the present method is the best we should know it as the result of the most careful study, as it is certainly worth something to have this determined. And, if such is not the case, what improvement is recommended?

What are the conditions which should be considered? One is the proper length of section. What are the limiting things to establish this length? I doubt if any good reason can be shown for our present practice beyond the fact that our experience with inherited plans seems to show that on a single track railroad of moderate length, six miles would appear to be proper, but there we end. We know little about the relative economy of increasing the number of sections and increasing the supervision thereby, or reducing the section and introducing such things as motor cars to reduce the delay by running over long stretches. And there is only one way to work it out, and that is by experiment. I think this one feature, namely, the use of motor cars, is simply a matter of economics. If it is economical it must first be shown that the interest, depreciation and cost of operation of such a car is less than the time lost in pumping over the road, plus the reduced efficiency caused by such effort.

I heard a very prominent railroad executive say a few years ago that the modern or future section organization would be a technical man as foreman, a gang of 15 men, a 10-mile section and a motor car. I have never thought that the outline was correct, especially the first specification—that of the technical man—because track work is not technical in most of its features, but I do not attempt to say that the balance of the specifications are not correct and there may be much merit in them.

One thing that leads to the suggestion of maintaining long sections is the growing difficulty of obtaining foremen, but this at once opens up another feature mentioned as one of

the distinct classes of economics, namely, working conditions and efficiency. There cannot be any doubt about one fact, and, that is, that foremen will not be hard to get if the position is interesting and attractive, because from the union of those two things springs contentment.

Let us stop to consider what goes to make the position interesting and attractive. One of course is compensation, and this opens up a vast argument, which volumes cannot adjust. Compensation in itself, as measured in standards of mediums of exchange, is not all that a man wants. He does want such compensation as enables him to live comfortably and perform his obligations to his family and lay by something, yet, the fact is that there is a certain market value upon the price of service of any kind, which generally follows the law of supply and demand, another economic principle which must not be lost sight of.

Another thing to make the position attractive is pleasant environment. This means comfortable living conditions for himself and family, educational advantages for his children, proper discipline and treatment, and above all the feeling that he is being aided to become a stronger man intellectually, and that there is a future for him as a reward for such effort to obtain intellectual advancement and enlarged experience.

The section foreman, as a class, is most responsive to such interest shown by his superior, and my experience has been that he wants to advance and will bend every effort to that end if given any encouragement. He should be made to feel that his position is an important one and while not equal to that of his roadmaster, yet, it is a means of rising to his superior's position. These are the things which produce contentment. The observance of them is not offset by doubly increasing his salary, for money cannot buy contentment.

We hear constantly the cry that we are not making section foremen. In years past we did not have to make them, and so we did not learn how to do it. They made themselves for us. Now we are confronted with a vastly different situation, and we will have to make them or we will not have any. And the time has come to make a very vigorous effort along this line. I believe the apprentice system is the only feasible means, but it has fallen down in many instances, because the apprentices were not willing to wait for advancement. The apprentice plan is for the purpose of preparing men for advancement and to make it successful two essential things must be done. 1. There must be a little higher rate of compensation paid than to laborers, so that they will not be attracted away by offers of increased compensation from employers needing temporary service, and 2. The proportion of apprentices must be limited to such a number as will insure reasonably early advancement, otherwise the individual will become impatient.

Now, having established a means for preparing men for foremen the work of education must continue with them. There must be a very systematic method for instruction along the lines of their work. I have always thought that the best plan was by frequent conferences and free discussion. Conference has the one great advantage over individual study that the viewpoint of the other man becomes known and often leads to a wider range of thought.

I do not for one moment minimize the great benefit to be derived from the educational bureau established by many railroads wherein a systematic course of study is outlined, for I think it is an excellent plan, but I do think that such a system is not sufficient in itself. It needs the stimulus of conference and discussion, for let us remember that the section foreman works hard physically and he is not by training a student, and it is hard for him to study alone to advantage.

Another thing of moment is that section foremen have very limited opportunity to discuss their work with others of their own class, which is one of the greatest aids from an educational standpoint. As a rule they are isolated from their fellow foremen and their only education or instruction comes from their supervisors or roadmaster, and it comes possibly

in very good shape, but too often in the form of notes of direction and not by a systematic plan of education, in which time is taken to analyze or discuss the matter very thoroughly.

The best method to obtain this is to call frequent meetings of all foremen of a district at a supervisor's headquarters, and at such meetings standards, expense, plans for work, etc., should be discussed. There is no better way to raise the standard of efficiency, and I know from experience that such practice will stimulate a great deal of interest on the part of the section foreman in his work.

The true measure of a man's efficiency is a thing not yet worked out upon mathematical lines. This is because conditions which affect track expense, particularly labor, are so different that it is a difficult problem. The only way that this can be done is to develop units of cost from the most elaborate tests so that a definite measure can be applied. One always hears the answer to such suggestion that such means involve clerical expense too high for the results obtained. In my opinion such reply is not always correct. The maintenance of way officer is obliged to measure the efficiency of his force by units of cost. If it is worth anything to know what the relative results of different sections or districts should be, it is worth something to have a system to obtain it correctly.

This brings up another feature, namely, equating track values. What does each particular condition of track mean in dollars and cents from a standpoint of cost to maintain? In other words, what does it mean in cost to maintain different classes of track, taking into consideration all of the things that affect expense? That is to say, what does curvature, kind of ballast, character of rail, quantity of traffic, etc., mean in dollars and cents?

One of the greatest difficulties met today by the man charged with the apportionment of expenditures is how to divide such expenditures equitably. The time has come when it is necessary to work on such a fine margin in apportioning money for maintenance that the most careful consideration is needed, and the judgment of the individual cannot always be relied upon to form the correct basis for such distribution. This is quite a difficult problem, for the factors which comprise it are: Speed of trains, weight of engines, quantity of traffic, alinement, character and age of rail, character of ballast, character of ties, character of roadbed, length of side tracks, width of right of way, climatic condition, etc. The relative value of those things is not known and yet it should be known by the supervisor, engineer, maintenance of way, and general officer.

There is only one way to work it out and that is by experiment, that is, by taking sections of track, representing various conditions as above outlined, and for a period of, say, one year keep a very careful record of the cost data. And, after such data is obtained, it will be possible to distribute money more easily and to hold up to the foreman the mark he can be expected to reach, and I know of no more important thing to work out. It will establish automatically a standard to which you can expect a man to attain without any allowances for conditions.

Another very pertinent and interesting question incident to this subject is the matter of extending the scope of duties of a section foreman to include to a limited extent certain work now handled by other classes of labor with a view to saving expenditure and time. To what extent such an idea can be carried out is not yet accepted; the possibilities are far from being known, but the fact remains that the idea warrants the most careful study. It may require greater ability and differently trained men to occupy the position of section foreman, but this alleged objection is not one which should kill the suggestion. The development of the idea and the application of the principle must be very conservative and gradual.

There is one more important feature connected with the economics of track labor, and that is planning work and executing it to the best advantage regarding season, labor, climate, etc. The demand for systematic planning of expenditure is greater than ever. I never feel like criticizing the manager when I hear an order go out for a certain reduction, even when it badly disorganizes everything, for I know that as a general proposition the executive has not been given very accurate information as to what such an action means. I know that very few, if any, men have taken the time to sit down and determine either by theoretical analysis or experiment just what disorganization means; what it means to do work in the least advantageous season of the year, what it means to work non-systematically.

We too often know that the wrong practice is being followed, and we say so, but to the man who must stand between you and the stockholder must be given some actual figures to support your views. If you are on a railroad which, owing to financial difficulties, prevents you from putting on your summer force until late in the season, demonstrate by the results on an experimental section what you can save by putting on your forces early and taking them off early, and I warrant that you will have no difficulty in carrying out the correct policy. Even if you cannot get all the money you want, you will get more for your money if you follow the right method.

A disturbing influence as far as track work is concerned is the fact that the fiscal year ends June 30, right in the midst of the busy season. It should end December 31, when forces are light and the least work is in progress, because it is perfectly natural for the end of the year to occasionally cause some disturbance in working plans. Stockholders are watching the net and do not of course understand the physical conditions. A strong effort should be made to have the fiscal year end December 31, and the reasons are those which concern your particular work and I believe convincing arguments can be made showing the advantages of changing the practice, which would greatly influence those who have the power to regulate this.

The field for study along all these lines is unlimited and must be quickly opened up, for the constant reduction in net earnings is causing enforced conservatism in apportioning track expense, and the public is analyzing failures of track structure more minutely all the time. Our managements expect us to determine the proper economic practice, to determine the capacity of the various features of the track structure and to be able to clearly prove the correctness of such practice and design as being entirely safe.

OTHER SPEAKERS.

James Burke, superintendent of roadway, bridges and buildings of the Erie, emphasized the fact that modern efficiency demands the best efforts of track men and track supply men alike in the developing and maintaining of track to carry the heavy traffic of the modern railroad. Track men of today are assuming a more important position than a few years ago because of this condition, and the position of foreman requires more intelligence than in previous years. Better material is likewise required for the same reason.

Other speakers were President William Shea, of the Roadmasters' Association; Past President A. M. Clough, and Secretary W. C. Kidd, of the Track Supply Association.

BUSINESS SESSION.

At the annual business meeting held on Friday morning Chicago was selected as the location for the next convention to open on the second Tuesday in September, 1914. The following officers were elected for the ensuing year: President, T. F. Donahoe, general supervisor of road, B. & O., Pittsburgh, Pa.; first vice-president, C. H. Gruver, road master, C. R. I. & P., Albert Lea, Minn.; second vice-president, B. C. Dougherty, roadmaster, C. M. & St. P., Beloit, Wis.; secre-

tary-treasurer, L. C. Ryan, roadmaster, C. & N. W., Sterling, Ill. Member of Executive Committee: P. J. McAndrews, roadmaster, C. & W., Belle Plaine, Iowa.

TRACK SUPPLY ASSOCIATION.

The exhibit of track supplies and devices conducted by the Track Supply Association occupied all available space in the corridor of the hotel adjacent to the convention hall and included a large variety of appliances manufactured by over 50 companies.

The meeting of the Supply Association was held on Thursday morning, September 11. The officers of the association for the past year were: President, A. H. Weston, Lackawanna Steel Company; vice-president, Walter H. Allen, Pennsylvania Steel Company; secretary-treasurer, W. C. Kidd, Ramapo Iron Works. The officers elected for the coming year are: President, Walter H. Allen, Pennsylvania Steel Company; vice-president, E. M. Fisher, Fairbanks, Morse & Company; secretary-treasurer, W. C. Kidd, Ramapo Iron Works, and members of the Executive Committee, Henry Fisher, Verona Tool Works, and L. P. Shanahan, American Steel and Wire Company.

EXHIBITS.

Ajax Forge Company, Chicago.—Ajax manganese guard rails. Represented by F. B. Bradley, H. G. Elfborg and H. C. Hutchins.

American Hoist & Derrick Company, St. Paul, Minn.—Transparency views of the American railroad ditcher. Represented by Edward Coleman and C. C. Austin.

American Steel & Wire Company, Chicago.—American railroad fencing and galvanized steel fence posts. Represented by J. W. Collins, L. P. Shanahan, C. W. Boon and B. B. Ayers.

American Valve & Meter Company, The, Cincinnati, Ohio.—Economy switch and interlocking stands, safety locks and quick-repair switch stands. Represented by J. P. McGarry and F. C. Anderson.

Associated Manufacturers' Company, Waterloo, Iowa.—Jerry Boy hand car engine with special features of magneto and reversing device. Represented by A. H. Ambrose.

Beaver Dam Malleable Iron Company, The, Beaver Dam, Wis.—Malleable iron tie plates and rail braces. Represented by B. P. Lamoreux and Frank B. Bell.

Barr, James C., Boston, Mass.—Brown rail loader. Represented by James C. Barr and Robert H. Anthony.

Blessing, Louis, Jackson, Mich.—Reinforced concrete tie, rail clamps and continuous rail joint. Represented by Louis Blessing.

Carnegie Steel Company, Pittsburgh, Pa.—Automatic stereopticon showing pictures of steel tie track; section of steel tie with new fastening, and Duquesne bar. Represented by M. M. Hench and Robert Coe.

Chicago Pneumatic Tool Company, Chicago.—Rockford motor cars. Represented by J. C. Camel and J. L. Canby.

Commercial Acetylene Railway Light & Signal Company, New York City.—Flashing and steady acetylene signal lights. Represented by H. G. Doran.

Crerar, Adams & Company, Chicago.—Calumet drills, Eureka bonding drills, new track shovel of vanadium steel, whitewashing machine, snow brooms, and Milburn lights for wrecking cars. Represented by Russell Wallace, G. D. Bassett, J. A. Martin and C. O. Swift.

Economy Separable Switch Point Company, Louisville, Ky.—Economy switch points and claw bars. Represented by W. M. Mitchell, J. A. Shoulty, John R. Long, J. R. Montgomery and L. C. Ferguson.

Elliot Frog & Switch Company, East St. Louis, Ill.—Switch stands. Represented by H. Elliott and W. J. Fairback.

Fairmont Machine Company, Fairmont, Minn.—No. 1 motor car, roadmasters' inspection car and 5-h.p. engine for section cars. Represented by F. E. Wade and H. E. Woolery.

Fairbanks, Morse & Company, Chicago.—Motor cars. Represented by A. A. Taylor, F. N. Whitesell, E. M. Fisher, J. T. Gratiot, D. J. Higgins, L. H. Mathews, E. E. Pendray, E. C. Golladay, F. V. Roy and L. Norvell.

Frictionless Rail, The, Boston, Mass. Represented by F. A. Barbey, S. W. Simonds and G. H. Bryant.

Haggard & Marcusson, Chicago.—"Tiger" steel bunk. Represented by Henry H. Marcusson and E. A. Sammons.

Hall Switch & Signal Company, New York City.—Signal appliances. Represented by W. J. Gillingham, Jr.

Hayes Track Appliance Company, Richmond, Ind.—Hayes derails. Represented by E. L. Ruby and S. W. Wallace.

Hobart-Allfree Company, The, Chicago.—Derailers and car replacers. Represented by W. H. England, E. H. Allfree and F. R. Cooper.

Joyce-Cridland Company, The, Dayton, Ohio.—Track and bridge jacks. Represented by C. D. Derby and W. I. Crock.

Kelly-Derby Company, Chicago.—Rail braces, combination tie and shimming brace and rail relaying machine. Represented by C. W. Kelly, R. E. Derby and W. B. Holcomb.

Keystone Grinder & Mfg. Company, Pittsburgh, Pa.—Tool grinders. Represented by Wm. L. Munk.

Lackawanna Steel Company, Buffalo, N. Y.—Tie plates and rail joints. Represented by A. H. Weston.

M. C. B. Co., The, Chicago.—Dinklage creep check and Conley frogs. Represented by W. E. Marvel, F. A. Buckley and C. R. Westcott.

Mudge & Company, Chicago.—Mudge-Adams inspection car and engine equipment for section cars, also railway specialty class FS section car. Represented by R. M. Smith, R. D. Sinclair, J. I. Winchell and G. W. Bender.

National Lock Washer Co., The, Newark, N. J.—Nut locks. Represented by John D. Seymour and Alvin T. Thompson.

National Malleable Castings Company, The, Cleveland, Ohio.—Tie plates, bridge washers, rail braces, anchors, combination rail tie plate, rail brace, and rail anti-creeper. Represented by James L. Pray, J. J. Byers, C. H. McCrea, C. L. Johnson and W. B. Bellman.

Northwestern Motor Company, Eau Claire, Wis.—Casey-Jones hand car engines. Represented by K. Rosholt and R. R. Rosholt.

P. & M. Company, The, Chicago.—Rail anchors and anti-creeper tie plates. Represented by F. A. Preston, Philip W. Moore, D. T. Halberg, A. R. Sutter, L. S. Walker, J. W. Dodge, Jr., and George E. Johnson.

Positive Nut Lock & Tie Company, Grand Rapids, Mich.—Positive nut lock. Represented by M. M. Goble.

Positive Rail Anchor Company, Louisville, Ky.—Positive rail anchors, and Betts anti-creeper tie plate. Represented by W. M. Mitchell, J. A. Shoulty, John R. Long, J. R. Montgomery and L. C. Ferguson.

Q & C Company, The, New York City.—Vaughan rail anchors, Bonzano rail joints, rolled steel step joints, guard rail clamps, rail anchor testing machine in operation. Represented by A. E. Stokes, J. A. Bodkin, C. D. Woolworth and J. V. Westcott.

Pennsylvania Steel Company, Steelton, Pa.—Model 60-A shearable pin new Century switch stand, Model 50-A new Century switch stand rolled "never-slip" switch plate, Mayari steel, heat treated, "never-turn" bolts. Represented by Walter H. Allen, Fred H. Ogden, Geo. K. Reel and J. Drew Allen.

Rail Joint Company, The, New York City.—Rail joints. Represented by H. C. Holloway, W. E. Clark, Chas. Jenkinson, Fred A. Poor, W. S. Boyce, R. W. Smith and E. A. Condit, Jr.

Railroad Supply Company, Chicago.—Wolhopter shoulder flange. Represented by E. H. Bell, H. J. Van Nostrand, M. J. Cumerford, F. C. Webb and A. H. Smith.

Ramapo Iron Works, Hillburn, N. Y.—Switch stands, manganese switch points, rolled steel shoulder friction plate, and guard rail clamps. Represented by W. C. Kidd, T. E. Akers and Arthur Germunder.

Sellers Manufacturing Company, Chicago.—Tie plates. Represented by J. M. Sellers, R. A. Van Houten and G. M. Hogan.

Southern Railway Supply Company, St. Louis, Mo.—Saunders' car stopper. Represented by M. E. Towner, W. D. Achuff and D. R. Saunders.

Templeton-Kenly & Company, Chicago.—Simplex jacks. Represented by W. B. Templeton, A. E. Barron and A. C. Lewis.

U. S. Wind Engine & Pump Company, Batavia, Ill.—Switch stands and semaphores. Represented by C. E. Ward and L. E. Welcott.

Union Switch & Signal Company, The, Swissvale, Pa.—Keystone insulated rail joints. Represented by J. J. Cozzens and J. D. Roett.

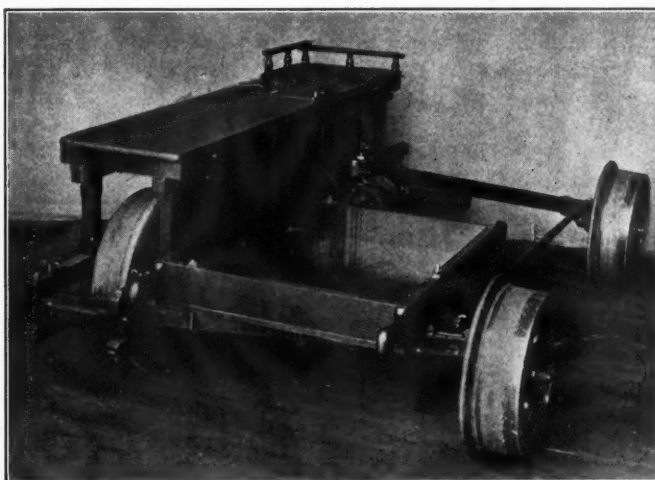
Verona Tool Works, Pittsburgh, Pa.—Complete set of track tools. Represented by Henry Fisher, Rex Gay and E. Woodings.

Whall, C. H., & Company, Boston, Mass.—Whall's special railroad fiber. Represented by C. H. Whall.

William Wharton, Jr., & Company, Inc., Philadelphia, Pa.—Manganese steel guard rail and brace, combination rail tie plates, guard rail clamp, anti-creeper, switch stand, pictures of important installations. Represented by R. C. McCloy, G. R. Lyman, J. R. Bolgiano and F. R. Schaefer.

A NARROW GAGE INSPECTION MOTOR CAR.

A narrow gage gasoline inspection car has been recently built for use on the East Broad Top Railroad & Coal Company in Pennsylvania, this line being of 3 ft. gage. In building this car it was necessary for the crossarms to be 1 ft. 8½ in. shorter than those of the standard gage car. The problem which then confronted the designer was to secure the proper distribution of



Narrow Gage Gasoline Inspection Car.

weight of the car to secure the greatest tractive power, and at the same time to maintain the equilibrium of the car when in operation. This car was built by Mudge & Co., Chicago, and is of the same general construction as the Mudge-Adams cars used on standard gage roads. The car is equipped with a 2-cycle air cooled, 4 h. p. single cylinder motor direct connected to the rear wheel.

A GERMAN EXPERIMENTAL RAILROAD.

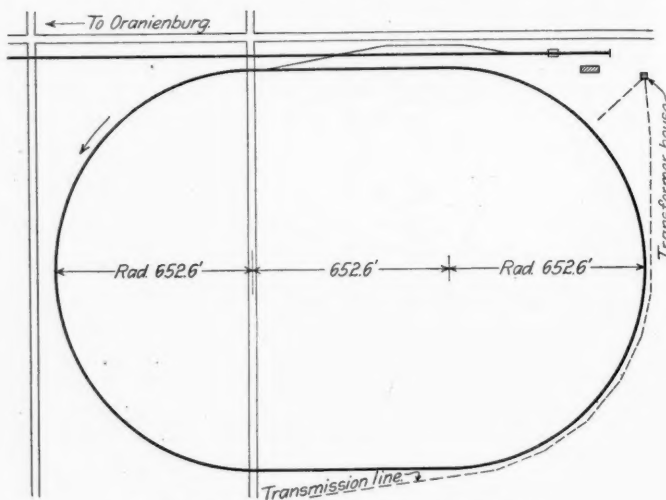
As mentioned in an article by B. B. Milner on "A Maintenance Department Testing Plant" in the *Railway Age Gazette* of August 15, the Prussian State Railways have maintained for some time an experimental track about 2.2 miles from Oranienburg, a city of 13,000 inhabitants about 18 miles from Berlin. On account of the importance of the suggestion made by Mr. Milner that a similar experimental station should be established in this country for determining the stresses in track and the testing of all kinds of track material, the following description, which is abstracted from a translation of an article in "Annalen fur Gewerbe und Bauwesen," will be of interest.

The plan of the experimental road is shown in the accompanying drawing. The track is laid on a plot of ground almost entirely level, the soil being hard, homogeneous sand which furnishes an excellent foundation for the roadbed. The track is elliptical in form, the curves at the ends having a radius of 652.6 ft. (about 8 deg. 47 min.) and being joined together by two straight stretches each about 652.6 ft. long. The total track length is 5,764.4 ft. The elliptical shape and comparatively short length was chosen because it allows the testing train to cover the entire track 28 times per hour at the normal velocity, which is 31 miles per hour. The sharp curvature which was necessary on so short a track is somewhat of a disadvantage, as this is rarely used on main lines, and on account of the limitations which it imposes on the speeds, makes impossible the observation of phenomena at velocities higher than about 37 miles per hour. It is also necessary to use a guard rail along the inside rails of the track so that the common conditions existing on curves of moderate degree cannot be observed. These disadvantages were considered of minor importance, however, in comparison with the requirement of high traffic frequency. The curves are superelevated for the 31 mile velocity, this elevation amounting to 4.9 in. Various rates of attaining this maximum elevation are tried at the ends of the curves in order to compare the effect of such variations on the wear of the track and equipment.

Such a road can, of course, be operated only with electricity to make possible the control of the train from an outside point. Until April, 1908, two locomotives that had been used experimentally on one of the government lines were operated over the experimental track. Then a locomotive weighing 60 tons was used, pulling a freight car as a trailer, the total weight of car and locomotive being about 250 tons. By using the third motor of the locomotive this weight could be increased to 375 tons. This locomotive was operated 20 hours a day, from 11 a. m. until 7 a. m. of the next day, with two brief intermissions for inspection. It made from 450 to 500 round trips over the track, a total distance of about 512 miles. It has been found possible to operate the locomotive about 250 days a year, making a total of about 117,500 round trips. This locomotive has recently been

replaced by another, which is shown in the accompanying photograph. The power used for operating these locomotives is secured from the Oranienburg City Electric Works, about 2.3 miles away, the current being transmitted at 6,000 volts, 25 cycle, single phase, a. c. and stepped down in the locomotive to 400-500 volts.

Up to the year 1909, the track was divided into four sections in each of which a different type of track construction was laid. On each section oak, red beech, pine and steel ties were laid, and throughout the length of the track various kinds of stone



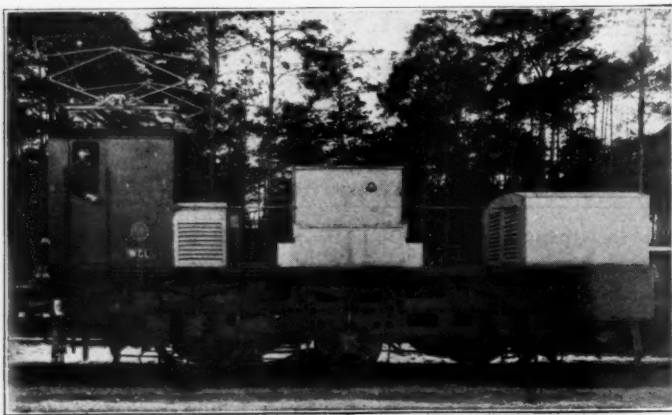
Plan of German Experimental Track.

and gravel ballast were used, the distribution of the ballast in the four sections being the same so that comparative tests could be made. In this manner a large number of stretches of experimental track were created which were carefully observed for settling and lateral movement as well as cost of maintenance. Movement in the track was measured by means of a graduated scantling laid crosswise over the track on posts set alongside. It was found, however, that such posts cannot be placed secure enough in the embankment to allow exact measurements to be made and securely anchored rails onto which metal strips have been bolted have now been substituted for the posts. The settlement at joints was measured by a graduated wedge which could be inserted under a straight edge laid over the top of the rail.

The maintenance of this road is under the direction of a roadmaster, a section foreman, two section hands and three guards, two of the latter being employed during the day and one at night. This force keeps the track and equipment in repair and keeps careful records of all costs. The instructions are to maintain the track to the same standard as that necessary for fast passenger and heavy freight service.

As examples of the tests which have been and are being carried on at this experimental station, the following are given: To determine the wear and deterioration of rails of various forms and laid by different processes, as for example, chrome, electro-steel, silicon steel, etc.; of ties of all forms and materials, of tie plates, fish plates, rail joints, screw spikes and rail braces, to test the various systems of roadbed construction, the various kinds of safety, switching and signaling devices, various oils and paints and track tools, such as rail saws, drills, wrenches, ballast forks, etc.

In discussing the results secured at this station, Councilor Samans of the Central Bureau of Railroads, which has charge of the experimental road, brought out the following points in justification of its continuance. It is frequently urged that in the development of railroading all types of construction can be tried in service under actual operating conditions. While it is admitted that experiments are necessary to determine the exact manner in which the track is being affected by the rolling stock, it is often considered that ample opportunities for such experi-

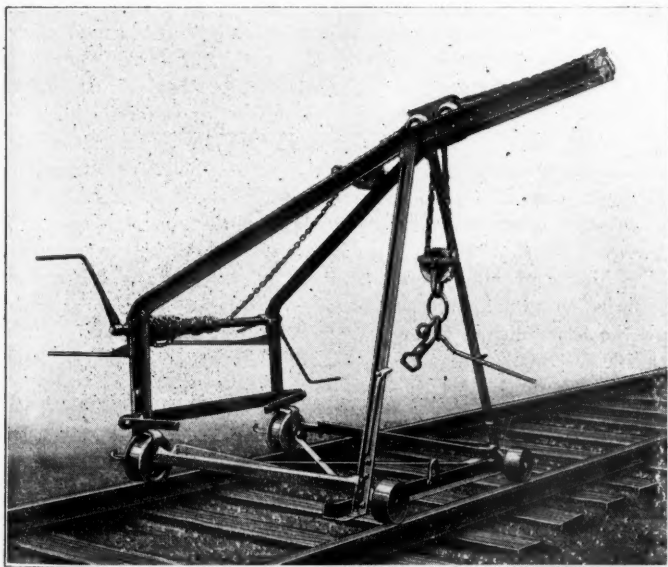


Electric Locomotive Used on German Test Track.

ments are to be had on existing lines. Such service tests are of value and on the state railways of Prussia and Hesse numerous stretches of track have been used for years for experimental purposes. On none of these stretches, however, is the entire track under observation in order to establish the laws governing the relation of its parts, but in each case some particular feature or noteworthy invention is being tried out. As a result of such tests there probably is no railroad management that has not been forced to trace back along some wrong path. The cause of this is in many cases due to the insufficient supervision given the test. The officer in charge can hardly give as much time to the observations as they require, and it is largely a matter of chance whether the men immediately concerned with the maintenance of the road can or will assist in the experiments. To observe and take measurements is not within everybody's scope of ability. Frequently only such things are seen as are expected and as correspond with one's previously fixed opinions. By the establishment of the station, all of these disadvantages have been eliminated and excellent results have been secured.

THE THREE MEN TRACK LAYER.

A new machine for saving labor in laying rail which was designed by P. H. Madden, roadmaster, Chicago, Milwaukee & St. Paul, Sparta, Wis., has recently been placed on the market. The machine is designed to be operated by three men, and consists essentially of a light steel frame supporting at the rear a drum operated by two cranks upon which is wound the hoisting chain. It can be operated either on four wheels or two, double flanged wheels being provided at the rear and plain wheels at the front, which are mounted upon axles that can be swung



Three Men Track Layer Mounted on Four Wheels.

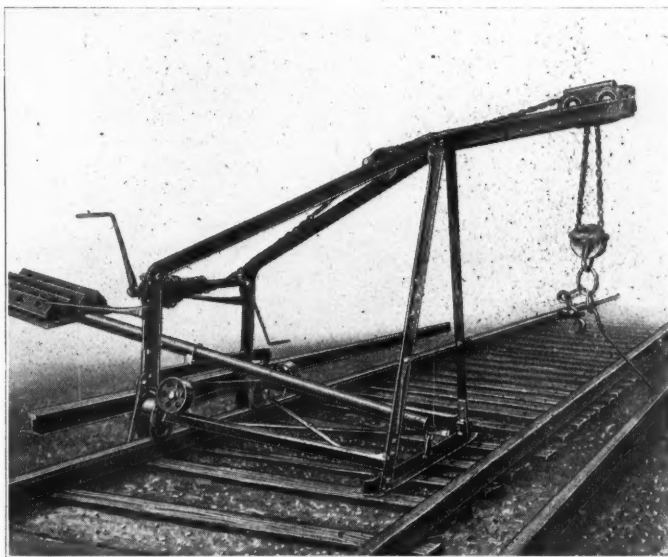
back under the frame when the machine is in use for laying track.

When the front wheels are swung back the steel A frame at the front of the machine rests upon the ties, giving the machine the stability necessary for pulling in and lifting the new rail. The hoisting chain with the rail tongs attached is run out far enough to allow the tongs to engage the new rail and the two men operating the drum can then drag in the rail to position. Having lifted out the old rail the new one is heeled in, two men operating the drum and the third man guiding the rail.

A detachable counterbalancing lever is provided, having a platform upon which splice bars, spikes, or other track material can be placed to balance the machine and to allow it to be read-

ily moved without the use of the front wheels. If both rails are in position the front wheels can be swung into place and the machine operated on four wheels. If it is necessary to move rails, frogs or other heavy material, they may be swung from the hoisting chain and transported to any desired point on the four wheels.

The complete machine weighs less than a hand car and can



Three Men Track Layer Equipped to Lay Rails.

easily be lifted from the track and carried by four men. The machine can also be used as a substitute for the ordinary rail loader by placing it upon a flat car, allowing it to pick up rails from the ground and place them on roller blocks to be rolled endwise into stock, flat or gondola cars at either end of the flat car.

The machine has been thoroughly tested in service and is now being used at a number of points with good results. One of these machines is in use on the main line of the C. M. & St. P.,



Heeling In a 90-lb. Rail.

between Russell, Ill., and Wadsworth, on July 23, laid 184 100-lb. rails in four hours. It was necessary to close up the track twice in this time for two passenger and one freight train, causing delays of 20 and 25 min., so that the actual working time was 3 hours and 15 min. The gang used in this case consisted of 71 men. Another machine is in use on the Janesville line

of the C. M. & St. P., near Grays Lake, laying 75-lb. rail. Each of these machines effected a saving of from nine to 16 men in the gang. Several of them have also been used on the Great Northern and the Northern Pacific for the past two years.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.

The twenty-third annual convention of the American Railway Bridge and Building Association will be held at the Windsor Hotel, Montreal, on October 21-23, 1913. Committee reports will be presented on the subjects of water supply, track scales, equipment and tools for bridge gangs, concrete culverts and various kinds of pipe for culverts; heating, lighting and ventilation of roundhouses and shops; motor cars for bridge gangs; temporary structures for supporting tracks during construction of permanent work, sewers, etc.; concrete posts, poles and signs; snow fences; preservation of timber, cattle guards and fire-resisting coatings for timber.

The programme is as follows:

TUESDAY, OCTOBER 21.

Morning Session.

Call to order by the president at 10 o'clock.
Prayer.
Opening address by Wm. McNab, Principal Asst. Engr.
Grand Trunk Ry.
Response.
Roll call (card registration system).
Reading of minutes of last meeting.
Report of executive committee.
Reports of secretary and treasurer.
Report of committees on membership, memoirs and relief.
Election of new members.
Recess to welcome new members and for the payment of dues.
President's address.

Afternoon Session.

Call to order at 2 o'clock.
Appointment of committees.
Reports of committees on subjects.
Discussion of reports.

Evening.

Meeting of executive committee at 7:30.

WEDNESDAY, OCTOBER 22.

Morning Session.

Call to order at 9 o'clock.
New business.
Unfinished business.
Reading of report of nominating committee.
Reports of committees and discussion thereof.

Afternoon Session.

Call to order at 2 o'clock.
Reading and discussion of committee.

THURSDAY, OCTOBER 23.

Morning Session.

Call to order at 9 o'clock.
Unfinished business.
Election of officers.
Selection of meeting place for 1914.
Installation of officers.
Adjournment.

The Committee on Arrangements has planned a visit to the new St. Lawrence River bridge and to the shops of the St. Lawrence Bridge Company's plant, where the Quebec bridge is being fabricated. On Friday a trip will be made by special train to Ottawa.

The steady growth of the association during the past year indicates that this convention will be successful both in the character of its discussions and in the attendance of its members. Arrangements are now being made for those members living west of Chicago to go in a party on special cars leaving Chicago on Sunday afternoon. Members or guests desiring to go with this party should advise the secretary, C. A. Lichty, C. & N. W. Ry., Chicago, as soon as possible.

EXPLOSIVES FOR USE IN TUNNELING.

It is generally recognized that an explosive having a high disruptive force is preferable for tunnel work. On account of the cost of drilling holes it is usually more economical to drill a few holes and load them with an explosive of high disruptive force rather than to drill a larger number of holes and use a weaker and cheaper explosive. The only two classes of available explosives for this kind of work are "straight" nitro-glycerine dynamites and gelatine dynamites. It is also important for such work, which is done in closed spaces, that the explosive produce the minimum amount of poisonous gases. The gelatine dynamites, which are otherwise most suitable, are not satisfactory in this respect. According to Bulletin 48 of the Bureau of Mines, a formula for gelatine dynamite has been prepared by the bureau which shows on test no poisonous gases resulting from its detonation. This formula for 40 per cent. strength gelatine dynamite is as follows: nitro-glycerine, 33 per cent.; nitro-cellulose, 1 per cent.; sodium nitrate, 54 per cent.; combustible material (flour), 11 per cent., and calcium carbonate 1 per cent. It is believed by the bureau that this illustration of the possibility of producing a gelatine dynamite that will not evolve poisonous gases will result in its being commercially manufactured.

THE FOREMAN PROBLEM.*

By S. B. PETER,

Roadmaster, St. L. & S. F., Pittsburg, Kan.

There are two plans that I consider practical for solving the foreman problem.

The first is to increase the wages paid to section men to 17½ or even to 20 cents per hour, so that a better class of men might be secured. This would make it possible to secure American labor, or at least the better class of foreign labor, such as Irish, Scandinavian and German. This would not necessarily increase the payroll, as men could be secured at \$2 per day that would do as much work each day as two of the men that we get at \$1.25 per day. This would enable us to secure the material out of which the best foremen are made; and after we have secured the men, we should keep them in the service all the year around. The hiring of big gangs of Greeks and Mexicans for a few months in the summer and fall, and the cutting off of practically all the force during the winter months has created the foreman problem. Small gangs of good live men, at living wages, kept all the year will solve the problem, decrease the cost of maintenance, and insure us safer tracks.

Another plan that has been tried with a measure of success, is to employ a first man, or an assistant foreman on each section, selecting as far as practicable, young men with fair education, who are not afraid to work, and paying them 25 to 35 cents per day more than the regular section wages. This with the Sunday track walking enables them to earn from \$45 to \$50 per month. When such a man has been in service long enough to become competent, he is given charge of the section at any time the regular foreman is absent for any cause. By having a man of this kind in each gang a greater amount of work can usually be accomplished each day with the class of men we are now using, and there is always a man available who is competent to go to any point on the section to make repairs to broken rails, or do any of the small jobs that come up so frequently and do not require the service of the entire gang. This enables the foreman to stay with the gang and push the work. If occasion demands, the foreman can go and look after any small jobs or take a walk over his section, and be assured that the assistant will be looking after the work in his absence.

*Received in the contest on The Foreman Problem which closed March 25, 1912.

General News.

The United States district attorney at St. Louis has filed suit against the Illinois Southern to recover penalties of \$8,000 for alleged violations of the hours-of-service law and for failure to report such violations.

The Pennsylvania has issued orders to train conductors to visit sleeping cars at frequent intervals and see that either the conductor or the porter is on duty and alert for any emergency that may arise. Porters who have slept over a part of their run will have to change their habits.

James J. Hill entertained 360 members of the Veterans' Association of the Great Northern Railway, at Glacier Park, Montana, on September 16, Mr. Hill's seventy-fifth birthday. The association includes officers and employees who have been in the service of the company 25 years.

The Southern Pacific and the Order of Railroad Telegraphers have reached an agreement in a controversy which has been under dispute since last June. The agreement provides for an increase of wages of approximately 10 per cent., and changes of working conditions for about 1,200 operators.

Officers and employees of the Pennsylvania are now wearing on their coats a "safety button" about 1/2 inch in diameter. It is enameled in white, red, green and gold, and bears on its face the insignia of the railroad, a keystone, with the initials P. R. R. in the center, and the words "safety first" in the rim.

The Illinois Central and Yazoo & Mississippi Valley have created a weighing bureau at Chicago to take charge of the supervision of all matters pertaining to the ascertainment of correct weights and the assessment of revenue based thereon. The bureau will be in charge of Fred W. Souerby, who has been appointed superintendent of demurrage and weighing.

The Midland Valley Railroad has recently put in service between Wichita, Kan., and Arkansas City, 51 miles, a gas-electric motor car. The car makes one round trip a day. The running time each way is 2 hours 45 minutes, and there are seven regular stations and six flag stops. The car was made by the General Electric Company and is 71 ft. 8 in. long with passenger, smoking and baggage compartments.

The Manufacturers' Railway of St. Louis, which is owned by the same interests that own the Anheuser-Busch Brewing Association, on August 1 submitted to the 22 railways entering St. Louis a proposition providing for agreements for joint use of its facilities. On September 13 the proposition was withdrawn and it is reported that the company has purchased the St. Louis & O'Fallon Railway, and also has acquired trackage rights over the Alton & Southern.

Representative Willis, of Ohio, has introduced in Congress, a bill providing for the regulation of railroad scales by the Interstate Commerce Commission and making unlawful the use of any weighing device, for determining freight charges, which has not been approved by the commission. There is a provision that the American Railway Association shall establish a standard for scales and submit the same to the Interstate Commerce Commission for approval.

A press despatch from Jackson, Tenn., reports that an attempt to hold up a Mobile & Ohio northbound train on the night of September 13, was frustrated by an armed guard of fifteen men who had been expecting the holdup. The bandits, who had climbed aboard the engine at a point ten miles from Jackson, jumped when the firing began and escaped into the woods, firing back as they ran. No one was wounded so far as known. The posse left the train and began a search of the surrounding country for the robbers. A farmer who lives near the scene of the holdup and who was taken into the confidence of the bandits weakened and gave the information that prevented the robbery.

Committees representing the railroads, responding to an invitation from the Interstate Commerce Commission for suggestions concerning methods to be pursued by the government in making valuations of railroad property, have asked that they be permitted to file copies of maps already made (instead of

making new drawings) showing locations of road. It is estimated that to make entirely new drawings of all railroad lines would cost on the average \$20 a mile. In addition the railroads also object to any requirement being put upon them to furnish the boundaries of or information concerning adjacent lands or the names of the owners. The carriers have no right to enter upon the lands of others for the purpose of making surveys to obtain boundaries, and the names of the owners, particularly in the cities, are numerous and difficult to obtain, and when obtained would be of little value when placed on a map because of the constantly changing ownership.

Special Despatch from Our Special Correspondent.

On Monday, September 1, for the first time in 44 years, Charles S. Mellen, ex-president of the New Haven, paid his fare on a railroad, going from West Stockbridge, Mass., to New York.

Chicago Arbitrators' Decision.

W. J. Jackson, F. A. Burgess and E. C. Houston, the arbitrators appointed to decide questions of wages between the Chicago & Western Indiana and the Belt Railway of Chicago, and their locomotive enginemen, made their report on Tuesday of this week, and they held that the roads were not justified in paying the higher wages demanded by the employees, except that they awarded an increase in the work train rate from \$4.15 to \$4.40 a day. Some changes in working conditions were approved. The board found that these two roads were paying higher wages than are paid by the majority of Chicago lines for the same services.

A Large Staff Meeting.

President Daniel Willard, of the Baltimore & Ohio, is presiding, this week at a meeting of the officers of the operating and engineering departments of the road. The meeting was announced to be held at Deer Park, Md., beginning Wednesday. Officers from the whole system, including the Cincinnati, Hamilton & Dayton, the Staten Island, the Sandy Valley and the Elkhorn lines were present, about 200 men in all. A number of special trains were run. The program provides for addresses from 20 officers, each speaking on the work of his department. Temporary offices were opened at Deer Park, with a special corps of telegraphers, stenographers, etc., so that officers remote from their headquarters could continue their business, so far as might be necessary, without interruption because of being absent from home.

Safety at Grade Crossings.

The Pennsylvania Railroad has posted on the bulletin boards at all stations on the system a large bulletin, headed as above, and printed in two colors, calling attention to what it has done for safety at crossings. The bulletin is headed with a quotation from a letter by President Rea, saying: "The railroads are only too happy to remove all grade crossings, to equip every mile of track with automatic block signals, to make every car of all steel construction, but to do these things is utterly impossible without the money with which to pay for them." The main part of the bulletin is the following:

"There remain on the 11,000 miles of line comprising the Pennsylvania System 13,027 crossings at grade. It costs an average of at least \$50,000 to remove a grade crossing. Thus, to eliminate every such crossing on the lines of this system would cost upwards of \$600,000,000. The various companies of this system have since 1902 expended \$66,641,294 in improvements resulting in the elimination of 1,052 grade crossings."

The bulletin concludes with the following appeal to the public: "Grade crossings are unavoidable. Without them, few railroads could have been built in this country. They are one of the inconveniences of progress, to be eliminated just as fast as possible. Railroad officers are doing their best, but it all takes time and money. Meanwhile, the public demands that trains be run on time. To do so involves speed over crossings. The railroad appeals to the driver of every vehicle and every pedestrian before crossing a railroad track to 'STOP, LOOK, LISTEN.' A little care and a momentary stop may mean the saving of a human life.

"Human lives are the most precious things in the world."

Pennsylvania Rules for Promotion of Firemen and Enginemen.

The Pennsylvania Railroad has issued rules on this subject substantially as follows:

A fireman will not be promoted to engineman unless he has had at least 528 days' experience as a fireman. The first promotion is to extra freight engineman; but this is conditional on the candidate having had at least 132 days' experience as road freight fireman, either through or local, immediately preceding his promotion.

Extra freight enginemen are promoted to regular freight enginemen.

Regular road freight enginemen are promoted to extra passenger enginemen, but always provided the candidate has had at least 528 days' experience as freight engineman, not less than 150 days of which must have been in road freight service, immediately preceding his promotion. This in no way depreciates the application of regulation No. 1.

Extra passenger enginemen are promoted to regular passenger enginemen.

A man going through the above grades must, of course, pass all the necessary examinations incident to each grade.

At the present time the average service of a fireman before promotion to engineman is from six to eight years.

Arbitration of Trainmen's Wages.

The arbitrators who are to settle the controversy between the Eastern railroads and their conductors and brakemen, regarding wages—Messrs. A. H. Smith, W. W. Atterbury, D. L. Cease, Seth Low, J. H. Finley and L. C. Sheppard, began their sessions in New York City last week, and have taken a part of the testimony offered by the trainmen. Hon. Seth Low was chosen chairman of the board.

The representatives of the employees presented a large number of tables and diagrams to show the hazards of the trainmen's work, comparisons being made with the number of men killed and injured in 1902 and 1912; and the alleged special hazards of double head trains was emphasized. It was stated that large insurance companies have instructed their agents against writing life insurance policies for trainmen. On the Eastern roads the density of traffic has increased the risks to life and limb.

F. J. Warne, who presented the statistics on behalf of the trainmen, called attention to the increase in the size, weight and carrying capacity of freight cars during the past ten years.

Mr. Warne also presented voluminous statements to show that two-thirds of the railroads in the territory involved in this controversy are controlled by six of the large companies. Figures were given also to show the high cost of living at the present time as compared with former years.

Promotions on the New Haven Road.

General Manager C. L. Bardo, following long discussions with representatives of the enginemen's brotherhood, has issued a revised code of rules for the promotion of firemen and enginemen. The enginemen's committee, talking to the reporters and giving expression to various objections to the action of the road, say that the runners will not refuse to abide by the regulations; but it is intimated that the campaign for modifications will be kept up. Mr. Bardo's statement is in substance as follows:

"Rights of engineers and firemen to preference of runs shall be governed by fitness, ability, previous service and seniority. An engineer or fireman losing his run, by reason of it having been discontinued, or having been taken by an engineer or fireman his senior, or for any reason not brought about by any fault or action of his own, shall be entitled, if competent, to any run on the same division held by an engineer or fireman his junior in seniority.

"No engineer who has had less than one year's road experience as an engineer shall be allowed to run local passenger trains, and no engineer who has had less than two years' road experience as an engineer shall be allowed to run express passenger trains.

"No engineer will be allowed to run either local or through passenger trains until his competency has been certified to by the road foreman of engines and master mechanic, unless accompanied by the road foreman of engines or other competent

employee, until his competency is determined and certified to.

"Spare passenger engineers will not be permitted to run express passenger trains unless they have served a satisfactory probationary period as fireman or engineer in freight or local passenger service over a reasonable portion of the territory covered by the run, unless accompanied by the road foreman of engines or other competent employee, until his competency is determined and certified to.

"No fireman will be eligible for assignment or advancement to through passenger service until his competency is established.

"The list of spare passenger engineers will be composed of men taken from road service.

"The division superintendent will be responsible for the enforcement of these rules and the maintenance of proper discipline on his division. The decision of the superintendent in all matters of discipline shall be final, unless an appeal is made as prescribed.

"Any appeal from the decision of the division superintendent as to discipline, rates of pay, or working conditions must be made in writing to the superintendent within thirty days of the date of notice to employee affected.

"An appeal from the decision of the division superintendent as to dismissal will not be entertained until after a joint statement containing all facts from the division superintendent and committees representing the aggrieved employee has been made to the general manager, who will, if the facts justify, authorize an appeal. This appeal will be heard by a committee appointed by the general manager, at which time both sides will be represented, and the decision of the board, or a majority of it, will be final."

In announcing the rules Mr. Bardo issued a statement saying:

"There is no intention on the part of the management to impose hardship or onerous condition upon its employees. The rules are solely intended to promote safety in operation. They do not in any way interfere with or change the hours of service, the rates of pay, or other working conditions, and they are practically the same as on many eastern roads. . . ."

In a letter to the engineers and firemen he said:

"These rules are designed and submitted after a convincing demonstration that our existing rules do not meet the exacting demands of the service and to comply with the recommendations of the Interstate Commerce Commission and the Public Utilities Commission of the state of Connecticut, and are for the sole purpose of increasing the safety of our service and for the protection of our patrons and employees. There is no desire on the part of the management to restrict the rights or withdraw from service any man who is physically fit and by experience qualified for his position. These rules will not interfere with the seniority of the men except where the question of fitness, ability, and previous service are involved, and since these requirements can be definitely fixed by the record and service of the men involved there is no opportunity for favoritism and none will be permitted."

The Brotherhood Committee asserts that orders to "make time" issued in 1911 and the disciplinary results which accompanied failure to "make time" were largely responsible for conditions which have "demoralized the force"; and that a restoration of the conditions which existed before 1911 would accomplish everything desired.

Regarding the proposed change in the rules for examination for color, sight and hearing the runners say that they "do not wish, or ask to have a man with poor vision on the front end of any train. The rule under which we have been working for the past thirteen years has proved to be sufficient in every respect. . . . We have made it plain that seniority had no bearing unless a man was competent, and of that the company would be the judge. We do not ask, nor do we want, incompetent men to run engines. All we ask is, that provided a man is competent his length of service for the company shall count."

Three New Haven Trainmen Held.

Coroner Mix, of New Haven, on September 15, made his final report on the North Haven collision, and Engineman Miller, Flagman Murray and Conductor Adams are all held on criminal charges. Miller and Murray had been arrested the week pre-

vious, but the conductor is now held negligent in having entrusted flagging to Murray, "whom he had found to be careless and irresponsible." Engineman Wands, of train 91, is declared negligent in not properly observing the rules, but he is not held. The coroner says that questions of fixed signals and steel cars are not within his jurisdiction; they must be attended to by the State Public Utilities Commission. Miller is charged with manslaughter for "driving his locomotive recklessly, lawlessly, and at a high rate of speed." The testimony of engineers before the coroner was to the effect that the enclosed disk is a safe and efficient signal, had Engineman Miller observed the rules. It was Miller's duty to heed the signals, not relying in any degree on a warning of torpedoes or fusee. From the testimony presented before him, the coroner finds that the flagman had time to go back farther; he did not go immediately out when the train came to a stop, and he did not endeavor to go back the required distance. The coroner urges the Public Utilities Commission to make a thorough investigation of the system of discipline on the road.

The Prize for Enginemen.

Among the locomotive engineers who have responded to the offer of a prize of \$50 which was published in the *Railway Age Gazette* for August 15, and the *Journal* of the Brotherhood of Locomotive Engineers for September, in connection with a call for papers on *How to Keep a Perfect Lookout*, there is one, writing from Baltimore, who does not give his name. Readers are reminded that names are not to be published, except with the permission of the author; but they must be known to the Managing Editor (New York). Suppose this man should be entitled to the prize; how could it be sent to him? Our readers will be ready, like the philosopher, Emerson, to receive useful information from any source, but some knowledge of the writer's age and experience will be necessary in order to decide what is and what is not real information.

Public Should Pay for Steel Cars.

Close on the heels of the unfortunate accident on the New York, New Haven & Hartford, in which 21 persons were killed and a number of others were injured, comes the announcement from Washington that the Interstate Commerce Commission will force the railroads to provide steel passenger cars.

We think this is all right provided the Interstate Commerce Commission and the various legislatures will allow the railroads to raise the rate of fare. Surely the carriers cannot be expected to scrap millions of dollars' worth of equipment and buy new cars without some compensation for the loss, and surely the public does not expect the luxury of steel equipment without paying for it. Can it be that the American people do not comprehend the situation? Does the public think that the old adage about the rich people riding in chaises and the poor walking is not true in this day and generation?—*Manufacturers' News*.

Statistics of Failed Rails.

Bulletin No. 157 of the American Railway Engineering Association containing the rail failure statistics for the year ending October 31, 1912, has just been issued. These statistics are based on replies from 94 railways, with a total mileage of 182,000 miles, and include data on 14,132,982 tons of rail, of which 10,156,935 are Bessemer, 3,580,021 open hearth, and 396,026 miscellaneous alloy and special section rails. In addition to the usual diagrams and tables making comparisons of failures between different weights, sections and manufacturers of rail, additional data is given showing the results secured to date on numerous special tests in various parts of the country.

These statistics do not take into consideration differences in wheel loads, speed or tonnage passing over the rails. However, the averages are derived from a study of such large quantities of rails that they may be considered as fairly representing their performance. These statistics show that the average performance of the heavy sections (above 85 lbs.) is not as good as that of the lighter sections. The average rate of failure of open hearth rail is lower than that of Bessemer, although both are higher than for the previous year. The idea expressed in previous reports that possibly the rate of failure of open hearth rail will increase as its age increases so as to approach that of Bessemer rail is not corroborated by this year's figures,

the rate of failure of the Bessemer rail in 1912 being 116 per cent. higher than that of open hearth. It will be remembered that the early part of 1912 was marked by exceptionally severe weather, which was accompanied by an epidemic of broken rails. The committee repeats its conclusion of last year that the majority of failures was head failures, such as split or crushed heads, and was due, not to imperfect track conditions, but to defective material in the rail.

Railway Clubs and Safety First.

The common carriers of the country have learned that John Barleycorn in the habiliments of death sits at many a railroad crossing, at many a switch, and on many a siding, and rides upon the pilot of a hundred engines every day in the week. They might have nailed up the saloon door to their employees, and practically did so by forbidding a trainman under pain of discharge to enter any habitation where John Barleycorn had his domicile. The rule would have done little good if they had not discovered a more excellent way.

Block systems are good, and so are all other mechanical devices, but unless you get the man at the throttle valve to leave whiskey alone, deaths will occur on the track. By the introduction of a "more excellent way" a report upon the Southern Pacific system shows that in four years ended July 30, 1912, 150,000,000 persons had traveled on trains of that road "without killing a single passenger through collision or derailment." In one small railroad town of 3,000 inhabitants, twenty-nine saloons had flourished, and kept on flourishing in spite of the rule forbidding trainmen to patronize these places. Then the road introduced its "more excellent way" in the establishment of a clubhouse to take the place of the saloon, and six months later a dozen of the saloons had closed their doors because they would not pay. Two years after the club was opened, only seven of the twenty-nine saloons remained in business. Guidance was superior to obstruction, and education left prohibition away behind.

Something had to be done, for no man was required to pay entrance fees nor monthly dues to enter a saloon, so the railroads had to make their clubs as free as water that runs in the rivulet or as the air that circulates around the globe. The saloon is the most democratic place on earth, where all distinctions are left behind as each man enters the door. So in the clubs all men stand upon a plane of social equality. Another thing, the railroad clubhouses assume good behavior on the part of all who enter them, and there is never seen a sign prohibiting swearing, smoking, expectorating, or any other improper act. There are no "rules of conduct." The men are put upon their manhood and upon their good behavior. In an article in a recent issue of the *Outlook*, the discussion upon this subject closes as follows: "Social welfare workers will find food for reflection in the remarkable success of this enterprise, which vigorously suppressed every tinge of paternalism and patronage in order to lay hands upon the most elusive, unwitting individual, the adult, independent, self-respecting worker, and keep him out of danger, the danger zone of the saloon." And let all men rise up and sing Selah.—*Los Angeles Times*.

The Electric Headlight.

"In the Oklahoma Panhandle the first town made was Guymon. I had spent the afternoon there and intended to take a night train back to Liberal. A bunch of us were sitting on the front porch of the Commercial Hotel, playing cards, when I saw a headlight looming up down the track. I made a rush for my grips and yelled to the boy to get his cart and take 'em over to the depot quick.

"How's this," I said to the agent, "I thought this train was not due for an hour, and here she is not a mile away."

"Mister," he replied, "you better go back to the hotel and buy cigars for that bunch. This is your first trip down here, isn't it? Well, I thought so. That headlight is just forty-nine miles away; you've got pretty near an hour to finish that game of pinocle. This is the longest straight and level track in the country—one hundred and seventy-six miles, clear across the Panhandle without a curve or a hill. You see that house over there? That's where I live. I don't have to have a light in a lamp until after nine o'clock winter nights. About sundown the Golden State Limited looms up down about Texhoma, and

she shines right into my kitchen window for an hour, finally getting so bright that my wife has to pull down the curtains. It's a great saving, and my wife won't wash dishes by anything but electric light, and the young folks play croquet in my yard by the light. I never have to call the despatcher to get the time on trains. I climb to the roof of the station, get a line on the headlight occasionally, and mark up my board accordingly. Have you any baggage to check?"—*Moberly Monitor*.

Discipline Without Suspension on the Canadian Government Railways.

F. P. Gutelius, who was recently appointed general manager of the Canadian Government Railways, the Intercolonial and the Prince Edward Island, has issued a circular stating that it is the intention to insist on a more rigid compliance with the rules and regulations, which are made for the protection of the lives of the public and employees, as well as for the protection of the railway's property.

All employees will start with a clean record, beginning September 1. Any exceptional service rendered will be credited to the employee's record. A monthly discipline list will be issued. This list will show cause, extent of discipline, or action and extent of reward.

Employees will, as heretofore, be subject to summary dismissal for insubordination, drunkenness on or off duty, using intoxicating liquor when on duty, frequenting saloons, or places of low repute, incompetency, dishonesty, failing to carry out train orders and rules respecting train movement. Where previously discipline was meted out by suspension demerit marks will be placed in the record of an employee. For every repetition of an offence by the employee, the number of demerit marks will be doubled. When the demerit marks against any employee number 60, his services will be dispensed with.

For every 12 consecutive months, good service, free from demerit marks, an employee will have 20 demerit marks deducted from those that may stand against his record. Employees will be advised when demerit marks are recorded against them, the same as they have hitherto been advised respecting disciplinary measures in the past.

Men Who Help Raise the Average of Safety.

J. J. Maroney, of Hartford, Conn., has taken a prize from a New York newspaper as the man who has traveled the greatest distance on a commutation ticket during the past five years. Mr. Maroney lives in Hartford, travels to and from New York daily, the round trip making 220 miles. In the five-year term he has made this round trip 1,414 times; estimated distance 311,080 miles. The prize is a free ticket for six months. Frederick H. Smith, of Newark, N. J., has taken a prize for the world's record for continuous daily travel to and from work. For 62 years, or since 1851, Mr. Smith has made the trip between Newark and New York, nine miles, twice a day, barring Sundays, holidays and vacations. The greatest mileage made in a single year is placed to the credit of W. I. Lex, of Philadelphia, who made 55,325 miles between his home city and New York from July 1, 1908, to July 1, 1909.

A man writing from Pittsburgh claims that a resident of Leetsdale, Pa., has traveled more miles than Mr. Smith. He says: On a basis of 300 days to the year, eighteen miles a day and sixty-two years Smith's total mileage would be 334,800. This does not allow for vacations and sickness. I am acquainted with a gentleman living at Leetsdale, on the Pittsburgh, Fort Wayne & Chicago, fifteen miles from Pittsburgh, and he has been traveling between these points 55 years. Deducting a total of twelve years for vacations, sickness and some winters spent in the city, there would be forty-three years at thirty miles a day, 300 days a year, or a total of 387,000 miles, which is 52,200 more miles than the Newark record.

Governor Foss on Bankers, Brotherhoods and Interlocking.

The bankers and trunk lines that control the New England transportation system are interlocked, and in that interlocking there is no voice of New England. Three financial interests in New York City are the central money power of this country. These banks dominate the transportation system of all New England.

The engineer of the locomotive should owe his allegiance

to the railroad corporation, and the corporation should protect him and safeguard him in every way. But today, does the railroad engineer in New England recognize any allegiance superior to that of his labor union? Railroad men will tell you he does not. And the reason is perfectly clear. It is his union that has multiplied his wages to five-fold beyond what the engineer on the European train, doing the same work, receives as compensation. Have the wages of the unorganized trackmen or the unorganized gatemen been raised in proportion to the advance in the cost of living? Why not? The engineers of New England, substantially all of whom are enrolled in one labor union, are able at any moment to threaten a strike and paralyze the industries of New England in a day, if their demands are not complied with. What can the railroad officials do? Yield to every demand of the engineers and deny most of the demands of unorganized labor at the foot of the ladder? I am only asking you questions. I am not making assertions except as they are supported by official testimony.

I stand here as an independent citizen, wearing the cloak and collar of no party, and I denounce the foreign control of the New England railroads, and denounce the foreign control of the labor that captains the iron horses at the head of every passenger train in New England.—*Gov. E. N. Foss, of Massachusetts; speech at Worcester.*

Secret of Strength of C. N. R.

Sir William Mackenzie is Irish, and it is said of the Irish that they can "charm the birds from the bushes." At any rate, the British money market has never been able to say "No" to Sir William. He always comes back from London with the big "wad" sticking out of his hip pocket.

Of Sir William it is said that he can charm the money out of the reluctant British pocket. That pocket is never reluctant when Sir William fastens his blue eye on the British investor. He finds the man who must hear him, and to him he waxes eloquent. The market may be cautious. Money may be tight, but Sir William returns with the needed millions. There is something of mystery about the man and his methods. Other railway people have the chagrin of seeing their loans go a-begging sometimes.

The Canadian Northern is young; it is not completed; it is a one-man corporation; it began on nothing; it fed itself, section by section, and when it asks for \$20,000,000 the British investor who has been adamant to municipal securities, and even turned a deaf ear to such well-known people as the Grand Trunk (upon occasion), reaches down into his pocket and brings up the desired simoleons, to the requisite amount, and even more.

Then Sir William returns and things hum. The gaps are filled up, the line becomes continuous, the blasts are bigger in the tunnel, the big terminals in Montreal take shape—all nebulous as they have been and when you ask Sir William if there is not a stringency in the British money market he says innocently: "There may be. I did not encounter it."—*Exchange.*

Block Signals and Automatic Stops in Congress.

Representative Esch, of Wisconsin, who for several years back has introduced in Congress at each session a bill providing a scheme for making the use of the block system compulsory on the railroads throughout the United States, has introduced it this year (H. R., 8046, September 10) in a modified form, making action by the Interstate Commerce Commission mandatory instead of permissive ("shall" order the carriers to act) and including a section providing that the Commission may, on six months' notice, order a road to install automatic train control devices on any line where the block system is in use. It appears from the *Congressional Record* that Representative Mann, of Illinois, who introduced the resolution which was adopted on September 6 (noticed last week, page 470) and which carried an appropriation of \$25,000 for investigation, aimed simply to restore the "Block Signal and Train Control Board" or to establish a new board with similar functions, the idea being, apparently, to make it permanent. The full resolution is in substantially the same language as the laws of June 30, 1906, and May 27, 1908, under which the Block Signal Board acted. In the course of the discussion in Congress one mem-

ber of the House reported Mr. Prouty, of the Interstate Commerce Commission, as saying that the Commissioners did not want any such appropriation at this time; that they proposed to deal with the subject constructively next December (when they will send to Congress their annual report). The vote on Mr. Mann's resolution was taken in Committee of the Whole, and was 34 to 30. The urgent deficiency bill, of which this is a part, has not yet come up in the Senate.

Methods of Surety Companies.

It is because the private individual cannot afford to give bonds for strangers that surety companies have come into existence. You cannot afford to give a bond for a friend. Nowadays such requests are not often made. The surety business has advanced in this country during the last fifteen years until it has now reached the stage where it reckons its gains and losses by millions. . . . Since beginning business twenty-five years ago one surety company has smarted to the tune of fourteen million dollars, most of which has been lost on badly placed risks in the last ten years. But that one may smart and smart and still smile may be judged from the fact that the net annual profits of that same company have been from 20 to 30 per cent. "There is no business in the world," said the manager of a big New York bonding company, "in which you get such a close view of the vagaries of human nature. In spite of great losses this business makes optimists of all of us who are in it. We find far more good than evil in men." Every day in the year men who ask for bonds as cashiers, ticket agents, postmasters, and treasurers are rejected because it is discovered that they have extravagant wives. Another extra hazard is the county treasurer. If he hadn't been a good fellow, he probably wouldn't have been elected. He owes debts of gratitude, and something more solid than gratitude, to all the fellows who helped him into office. One risk is so hazardous that it is simply out of the question. That is the fourth-class postmaster, whom the surety company will not touch because he is so frequently touched by gentle rogues of all kinds. Many companies will not bond sheriffs, marshals and other police officers, for they and their sureties are liable for damages due to unwarranted arrests. Add this contingency to the likelihood of default, and you have a risk that is simply impossible. It is toward the end of the first term or anywhere in the second that defalcations are most numerous. In other words, all men generally start out in their official career to be honest, and are honest until continued temptation gets the better of them.

A red-haired, blue-eyed ticket agent of the Southern Railway in a good-sized town was so honest that he wouldn't use one of the company's stamps on a private letter. One night his office was entered by two masked men who leveled pistols at his head and commanded him to open his safe and shell out its contents, about three thousand dollars. The red-headed hero refused to comply with the demand.

"Not on your life!" he replied to the robber who gave the peremptory order. "I'm here in charge, and I'd rather die than hand out that money!"

"I guess you'll die then," was the cool reply. And with the remark went a bullet.

Three times the robbers fired at the hero with the red hair, and each shot took effect. The victim fell to the floor, and the robbers left him for dead; but they took no money with them. The railroad company gave the hero a gold watch properly inscribed, and when he was well enough to go back on the job again they raised his salary. Within six months Mr. Hero lit out for Canada with four thousand dollars of the company's money, which was made good by a surety company. He married soon after his raise of salary to a tender young thing who had to wear five-dollar silk stockings and fifty-dollar switches.

Of late years surety companies have become rather lenient with defaulters. There are today in this country hundreds of defaulters who are paying back in small instalments money lent them by bonding companies in lump sums to save them from prison. This letting a man make good and not prosecuting him, as surety companies so often do nowadays, would seem to be skimming pretty closely to the line of compounding a felony. Though in the eye of the law the embezzler is just as much a criminal as the safe breaker, with the average man who knows poor, weak human nature and what a continuous

round of temptation is the daily handling of other people's money there is always a feeling of leniency. If an embezzler has made good it would be a waste of time to prepare a case and bring him into court. Not once in a hundred times could he be indicted by a grand jury. Grand juries are only human, and this making-good business makes a mighty strong appeal to them. . . . The fact that so many surety companies have gone under of late is not due so much to lack of public confidence as to tremendous competition.—*New York Tribune*.

Maintenance of Way Master Painters' Association of United States and Canada.

The tenth annual convention of the Maintenance of Way Master Painters' Association of the United States and Canada will be held at the Hotel Henry Watterson, Louisville, Ky., November 18-20. A very cordial invitation is extended to all railroad engineers of test, engineers maintenance of way, division engineers, engineers of structures, supervisors of bridges and buildings, master painters of steam and electric roads to attend, furnish papers for discussion, and to encourage others to attend. List of open questions for discussion on which papers may be written are: Safety First; How Best to Prevent Accidents and Occupational Diseases. Value of Railroad Painting; Decorating and Neatness of Appearance as Advertising. Efficiency and Economy in Railroad Structural Steel Painting. What is the Most Effective Way of Protecting the Interior of Steel Tanks from Corrosion by the Effects of Different Kinds of Water? Value of Heavy Coatings on Horizontal Parts and on Solid Bridge Floors. What is the Best Practice in Taking Care of Signal Painting? How Can We Best Take Care of Structures Exposed to Exhaust of Engines, Smoke, Gases, etc.? Paint Oils, Other than Linseed. Inside Flat Finishes for Stations and Buildings. Contracting of Railroad Painting. Painting of Concrete and Cement Work. All subjects of interest to railroad maintenance so far as economy, preservation of structures and beauty of appearance is concerned. Typewritten copies of papers are requested to be mailed to the secretary by October 1.

Pennsylvania Industrial Welfare Efficiency Convention.

The Pennsylvania Industrial Welfare and Efficiency Convention will be held in the capitol at Harrisburg, Pa., October 28-30. The convention has been called by the Hon. John Price Jackson, commissioner of labor and industry and will consist of representatives of industrial establishments, engineers, contractors and other employers of labor doing business in Pennsylvania and representatives of labor, and heads of the various state departments coming in contact with engineering and industrial affairs of the state. The exhibit to be held in connection with the convention will be of a general engineering nature to appeal to the type of delegates attending the convention. The price for floor space will be 40 cents per sq. ft., including the standard booth, decorations, signs and reasonable amount of electric, steam, or compressed air power. These exhibits will be held in the building of the Harrisburg Railways Company, where about 26,000 sq. ft. of concrete floor space will be available. J. V. W. Reynnders, vice-president of the Pennsylvania Steel Company, Steelton, Pa., is chairman of the exhibit committee.

Railway Signal Association.

The eighteenth annual convention of the Railway Signal Association will be held at the Hermitage, Nashville, Tenn., October 14-17. On October 14 there will be the president's address and reports of the committees on Signalling Practice; Mechanical Interlocking; Power Interlocking; Automatic Block; Manual Block; and on Subjects and Definitions.

On October 15 there will be reports of the committees on Standard Designs; Electric Railways and Alternating Current Signalling; and on Wires and Cables.

On October 16 there will be reports of the committee on Storage Batteries and Charging Equipment; and reports of the special committees on Methods of Recording Signal Performance; State of Signalling in the Northwest; and on Specifications for Low Tension Wire Crossings.

Friday, October 17, will be devoted entirely to entertainments,

which will include a trip to Lookout Mountain in the morning, a buffet luncheon at the hotel Patten, and a trip to Chickamauga park and battlefield in the afternoon. Entertainments will also be provided for the first three days of the convention, including the annual dinner at the Hotel Hermitage on October 15.

Railway Club of Pittsburgh.

The members of the Railway Club of Pittsburgh and their guests will be given a day of outing and entertainment by the Westinghouse Air Brake Company at Wilmerding, Pa., on September 26. A special train will leave the Pennsylvania station, Pittsburgh, at 2:45 p. m., for Wilmerding, and upon arrival at that point the party will be conducted through the works of the Westinghouse company. In the evening the club will hold its regular meeting and entertainments will be provided. The party will return to Pittsburgh about 10 p. m.

American Electric Railway Association.

The American Electric Railway Association will hold its annual convention at Atlantic City, N. J., October 13-17. Some of the principal topics to be discussed will be Unsightly Poles; Profit Sharing with Employees; The Relation of Carriers to the Development of the Territory They Serve; Relief of City Congestion; Present Tendency of Public Service Laws and Regulations; Valuation; and Electric Railway Securities from the Investor's Viewpoint.

Bridge and Building Supplymen's Association.

The Bridge & Building Supplymen's Association will hold its annual meeting at the Hotel Windsor, Montreal, Que., October 21-23, in connection with the annual convention of the American Railway Bridge & Building Association.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

- AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May, 1914.
- AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Boston, Mass. Convention, May 19, 1914, St. Louis.
- AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York. Annual meeting, October 14-15, Philadelphia, Pa.
- AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill. Next convention, April 21, Houston, Tex.
- AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, St. Louis, Mo.; 3d Thursday and Friday in May.
- AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York. Next convention, October 13-17, Atlantic City, N. J.
- AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOC.—H. G. McConaughy, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.
- AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next meeting, November 19, 1913, Chicago.
- AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Convention, October 21-24, 1913, Montreal.
- AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 17-20, Chicago.
- AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.
- AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—A. R. Davis, Central of Georgia, Macon, Ga.
- AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.
- AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wenlinger, 11 Broadway, New York; 2d Tuesday of each month, New York.
- AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.
- AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md. Next convention, January 20-22, 1914, New Orleans, La.
- ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago. Annual meeting, May 28, Atlantic City, N. J.
- ASSOCIATION OF RAILWAY CLAIM AGENTS.—C. W. Egan, B. & O., Baltimore, Md. Next convention, May, 1914, St. Paul, Minn.
- ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago. Annual convention, October 18-24, Chicago.
- ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 112 West Adams St., Chicago. Next convention, May 20-23, New Orleans, La.
- ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York. Next meeting, December 9-10, Galveston, Tex.
- ASSOCIATION OF WATER LINE ACCOUNTING OFFICERS.—W. R. Evans, Chamber of Commerce, Buffalo, N. Y. Annual meeting, October 8, Philadelphia, Pa.
- BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—H. A. Neally, Joseph Dixon Crucible Co., Jersey City, N. J. Meeting with American Railway Bridge and Building Association.
- CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.
- CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursday, Montreal.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.
- CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.
- CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.
- ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, Oliver building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.
- FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va. Next convention, May 20-22, Galveston, Tex.
- GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.
- INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.
- INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. G. Hall, 922 McCormick building, Chicago. Annual convention, May 18-22, Chicago.
- INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 829 West Broadway, Winona, Minn. Next convention, July, Chicago.
- INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio. Next convention, third Tuesday in August.
- MAINTENANCE OF WAY & MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—W. G. Wilson, Lehigh Valley, Easton, Pa. Next convention, November 18-20, Louisville, Ky.
- MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.
- MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.
- MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOC. OF U. S. AND CANADA.—A. P. Dane, B. & M., Reading, Mass.
- NATIONAL RAILWAY APPLIANCE ASSOC.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.
- NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.
- NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3rd Friday in month, except June, July and August, New York.
- NORTHERN RAILROAD CLUB.—C. L. Kennedy, C. & St. P., Duluth, Minn.; 4th Saturday, Duluth.
- PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, Union Station, Peoria; 2d Thursday.
- RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.
- RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 2 Rector St., New York. Annual dinner, second week in December, 1913, New York.
- RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.
- RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOC.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.
- RAILWAY FIRE PROTECTION ASSOCIATION.—C. B. Edwards, Mobile & Ohio, Mobile, Ala. Next meeting, October 7, Chicago.
- RAILWAY GARDENING ASSOCIATION.—J. S. Butterfield, Lee's Summit, Mo.
- RAILWAY DEVELOPMENT ASSOCIATION.—W. Nicholson, Kansas City Southern, Kansas City, Mo.
- RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa. Convention, October 14, Nashville, Tenn.
- RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.
- RAILWAY SUPPLY MANUFACTURERS' ASSOC.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. Assocs.
- RAILWAY TEL. & TEL. APPLIANCE ASSOC.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.
- RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday except June, July and August.
- ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill.
- ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.
- SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmonds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.
- SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago. Annual meeting, September 23-25, Chicago.
- SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala. Annual meeting, October 16, 1913, Atlanta, Ga.
- SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.
- TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.
- TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo Iron Works, Hillsburn, N. Y. Meeting with Roadmasters' and Maintenance of Way Association.
- TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.
- TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.
- TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.
- TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library building, St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.
- TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7122 Stewart Ave., Chicago. Next convention, June 16, Jacksonville, Fla.
- TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.
- TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.
- TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y. Next meeting, Chicago.
- UTAH SOCIETY OF ENGINEERS.—Fred D. Ulmer, Oregon Short Line, Salt Lake City, Utah; 3d Friday of each month, except July and August.
- WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.
- WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.
- WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The Louisville & Nashville is to open a city ticket office in Pensacola, Fla., with A. C. Ryals in charge.

The Southern Railway has established an office of its land and industrial department at Denver Colo., with H. R. Buckey in charge.

The Traffic Club of Chicago held an outing at the Midlothian Country Club on September 17. The program included a golf tournament, base ball game and tennis.

President Willard of the Baltimore & Ohio announces that the new freight tariff to be filed by all the eastern and central traffic roads, advancing rates 5 per cent., will be ready by October 1.

In consequence of the drouth in Kansas, large numbers of cattle are being shipped from that state to Texas and Oklahoma. Ninety-one cars of cattle passed through Denison southward September 10. The Missouri, Kansas & Texas expects to carry more than 400 carloads.

At a meeting of the Central Passenger Association in Chicago on September 10, it was decided to put into effect a charge for handling prepaid orders for tickets either by telegraph or telephone on the basis of 1 per cent. of the amount of the order, but not less than 25 cents or more than \$1.

The Southern Pacific has announced that a "Sunset Limited" train will be put into service on November 16 between New Orleans and Los Angeles and San Francisco. Time will be 60 hrs. 45 min. from New Orleans to Los Angeles, and 58 hrs. 35 min. eastbound. The train will be run daily and no extra fare will be charged.

The United Fruit Company, running steamships between the United States and Central American ports, expects to carry 20,000 passengers to Panama during the coming excursion season, which includes the months of December, January, March and April. A large number of passengers have already engaged accommodations and it is believed that at least 12,000 will sail from New York City. Over 7,000 will probably go from New Orleans.

The Texas Railroad Commission has filed a suit in the United States district court at Austin, Tex., against the International & Great Northern, asking for penalties to the amount of \$5,000, and an injunction compelling the road to obey the commission's order to continue to absorb loading charges at the ports. The suit is on a test case agreed upon by the railways and the commission to determine whether freight billed to Texas ports and then re-consigned to other points in the state is to be considered interstate or intrastate business.

The largest volume of freight tonnage ever transported by the St. Louis railroads in the first half of any year was recorded for the six months ended June 30, 1913, according to statistics

compiled by Eugene Smith, secretary of the Merchants' Exchange, from reports prepared by the St. Louis carriers. The gross traffic for the six months was 26,680,815 tons. In comparison with the corresponding period of 1912, there was an increase of 3,090,734 tons, equivalent to 13.06 per cent. The gain over the first six months of 1909, five years ago, was 31.83 per cent., or 6,418,786 tons. The receipts for the first half of 1913 amounted to 15,897,246 tons, and the shipments to 10,783,569 tons.

The principal express companies have applied to the Interstate Commerce Commission for an extension of time in which to prepare and put into effect the rates for transportation of merchandise ordered by the commission in August. By the terms of the commission's order the rates would become effective on October 15. The companies say that it will be impossible to comply with the order by that date. Walker D. Hines, speaking for the five companies, expressed their willingness to comply generally with the provisions of the commission's order, but suggested certain modifications not affecting it in principle. Washington reports say that little doubt exists that the commission will grant the application, inasmuch as the companies agree to comply with the order.

The New York, New Haven & Hartford has lately put in service in New York harbor four steel car floats which are believed to be the largest in use. Each float has 17 watertight compartments, making it practically non-sinkable. The vessels are 343 ft. 6 in. long, 40 ft. 1 in. wide and draw five feet when loaded. They carry 22 cars each. The new floats are for use on the car ferry to the Pennsylvania, Jersey Central and Lehigh Valley terminals. On the average 2,100 cars a day are floated between these points. On August 11 two of these floats, lashed to one of the New Haven's tugs, transported 50 loaded freight cars. The cars and their contents weighed 3,341 tons. The New Haven's floating equipment in New York harbor now comprises fifty car floats and eighteen tugs. Of the tugs nine are of 1,000 horsepower and two are of 1,200 horsepower.

The Railroad Agriculturist Supplanted?

A press despatch from Towanda, Pa., says that the Pennsylvania State Department of Agriculture during the next few months is to run a special train, carrying a kitchen on wheels, throughout the northern part of that state for the purpose of instructing farmers' wives. Demonstrators will show how to conduct a model kitchen and approved methods of domestic science will be exemplified. The kitchens will be equipped with sanitary plumbing and the latest devices for cooking. The exhibit will be in charge of Mrs. Jean Folke, a state instructor in household economics.

Car Location.

The accompanying table, which was taken from bulletin No. 9-A of the American Railway Association, gives a summary of freight car location by groups on August 15, 1913.

CAR LOCATION ON AUGUST 15, 1913.

	New England.	N.Y., N.J., Del., Md., Eastern Pa.	Ohio, Ind., Mich., Western Pa.	Va., W. Va., No. & So. Carolina.	Ky., Tenn., Ala., Ga., Fla.	Iowa, Ill., Wis., Minn.	Mont., Wyo., Neb., Dakotas.	Kans., Colo., Okla., Mo., Ark.	Texas, La., New Mexico.	Oregon, Idaho, Nev., Cal., Ariz.	Canadian Lines.	Grand Total.
Total Cars Owned	87,781	678,157	279,995	202,855	170,545	477,747	17,032	151,998	30,487	132,466	138,389	2,367,452
Home Cars on Home Roads	45,757	398,077	109,183	106,201	90,037	331,625	5,810	81,180	14,498	77,743	96,956	1,357,067
Home Cars on Foreign Roads	42,024	280,080	170,812	96,654	80,508	146,122	11,222	70,818	15,989	54,723	41,433	1,010,385
Foreign Cars on Home Roads	46,633	282,153	194,452	71,702	66,974	179,277	8,653	67,825	24,465	53,853	40,059	1,036,046
Total Cars on Line	92,390	680,230	303,635	177,903	157,011	510,902	14,463	149,005	38,963	131,596	137,015	2,393,113
Excess or Deficiency	4,609	2,073	23,640	*24,952	*13,534	33,155	*2,569	*2,993	8,476	*870	*1,374	25,661
Surplus	1,470	6,521	1,124	5,658	1,217	13,767	580	8,595	2,263	15,432	12,626	69,253
Shortage	293	1,078	2,974	3,616	1,936	1,432	638	861	100	639	1,261	14,828
Shop Cars—												
Home Cars in Home Shops	6,148	40,721	22,281	13,749	16,885	25,114	643	10,281	2,554	5,630	4,977	148,983
Foreign Cars in Home Shops	940	8,072	8,397	1,979	2,140	4,577	429	2,147	817	2,293	552	32,343
Total Cars in Shops	7,088	48,793	30,678	15,728	19,025	29,691	1,072	12,428	3,371	7,923	5,529	181,326
Per Cent. to Total Cars Owned—												
Home Cars on Home Roads	52.13	58.70	38.99	52.35	52.79	69.40	34.11	53.41	47.55	58.69	70.06	57.32
Total Cars on Line	102.81	100.31	108.34	87.70	92.06	106.94	84.92	96.96	127.80	99.34	99.01	101.08
Home Cars in Home Shops	7.00	6.00	7.96	6.78	9.90	5.60	3.77	6.76	8.38	4.25	3.60	6.37
Foreign Cars in Home Shops .....	.89	1.19	3.00	.97	1.26	1.02	2.52	1.30	2.68	1.73	.40	1.38
Total Cars in Shops	7.89	7.19	10.96	7.75	11.16	6.62	6.29	8.06	11.06	5.98	4.00	7.75

*Denotes deficiency.

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railroads of the American Railway Association, in presenting statistical bulletin No. 151, giving a summary of car surpluses and shortages by groups from May 23, 1912, to September 1, 1913, says: The total surplus on September 1, 1913, was 73,576 cars; on August 15, 1913, 69,253 cars; and on August 29, 1912, 36,047 cars. Compared with the preceding period; there is an increase in the total surplus of 4,323 cars, of which 7,236 is in box, 1,197 in flat, 396 in coal, and a decrease of 4,506 in miscellaneous car surplus. The increase in box car surplus is in groups 4 (the Virginias and Carolinas) 6 (Iowa, Illinois, Wisconsin and Minnesota), 8 (Kansas, Colorado, Oklahoma, Missouri and Arkansas), 9 (Texas, Louisiana and New Mexico), 10 (Washington, Oregon, Idaho, California, Nevada and Arizona), and 11 (Canadian Lines).

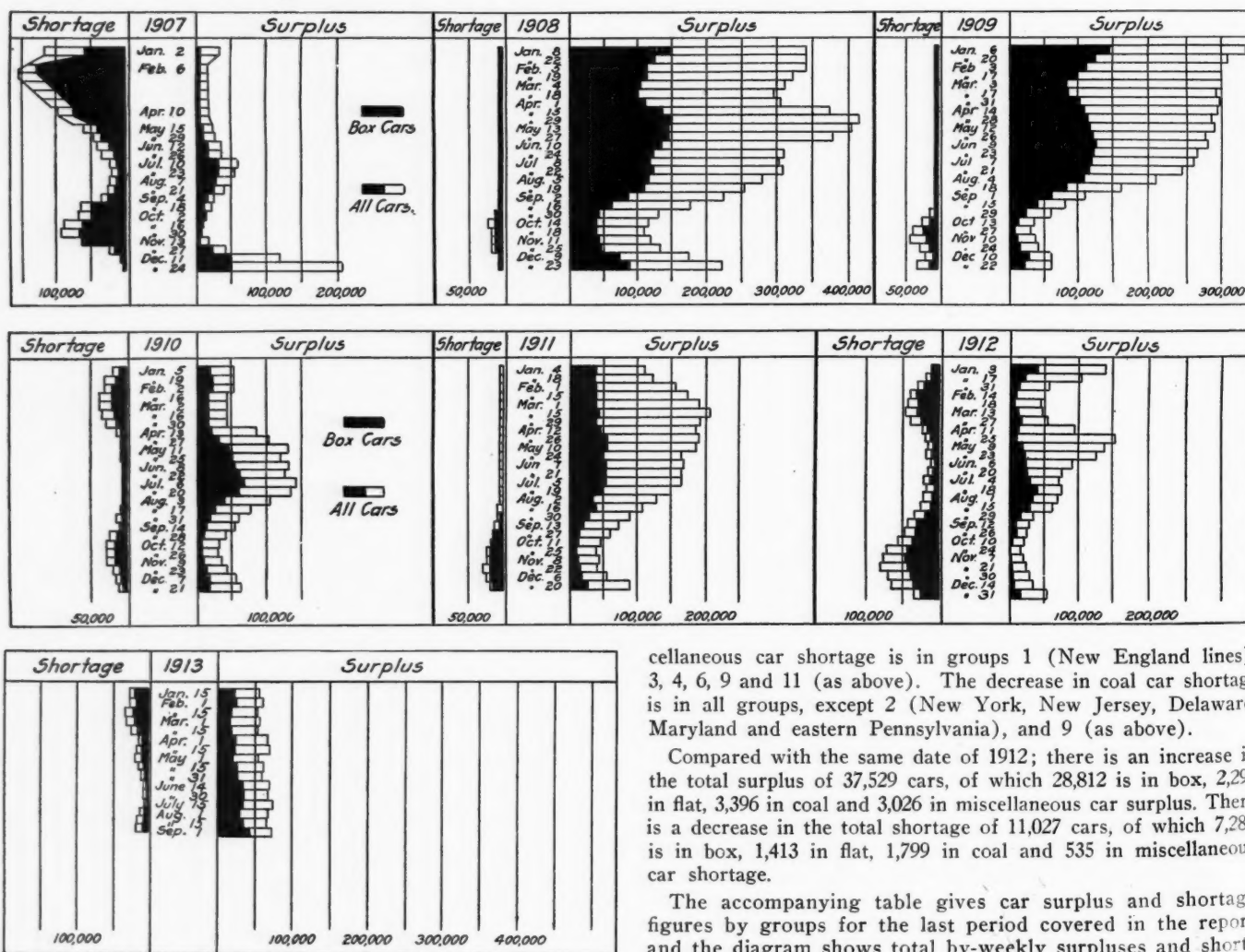
The increase in flat car surplus is in all groups, except 3 (Ohio, Indiana, Michigan and Western Pennsylvania), 7 (Montana, Wyoming, Nebraska and the Dakotas), and 9 (as above). The increase in coal car surplus is in groups 3 (as above), 5 (Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida), 8, 9, 10 and 11 (as above). The decrease in miscellaneous car surplus is in all groups, except 4, 5, 6 and 7 (as above).

The total shortage on September 1, 1913, was 15,270 cars; on August 15, 1913, 14,828 cars; and on August 29, 1912, 26,297 cars. Compared with the preceding period; there is an increase in the total shortage of 442 cars, of which 1,911 is in box, 20 in flat, 340 in miscellaneous, and a decrease of 1,829 in coal car shortage. The increase in box car shortage is in all groups, except 7, 8 and 9 (as above). The increase in flat car shortage is in groups 6, 8, 10 and 11 (as above). The increase in mis-

CAR SURPLUSES AND SHORTAGES.

Date	No. of roads.	Surpluses					Shortages				
		Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1.—September 1, 1913.....	7	1,010	229	5	17	1,261	159	34	185	9	387
" 2.—" 1, 1913.....	32	351	83	1,741	758	2,933	204	1	759	0	964
" 3.—" 1, 1913.....	32	1,315	249	300	1,665	3,529	1,254	200	1,328	155	2,937
" 4.—" 1, 1913.....	14	4,189	739	614	473	6,015	1,730	374	1,953	212	4,269
" 5.—" 1, 1913.....	27	510	764	131	529	1,934	850	435	864	0	2,149
" 6.—" 1, 1913.....	33	10,770	376	1,087	3,692	15,925	1,586	157	18	65	1,826
" 7.—" 1, 1913.....	4	7	10	218	218	453	62	0	0	0	62
" 8.—" 1, 1913.....	20	5,548	115	2,203	2,111	9,977	280	101	55	8	444
" 9.—" 1, 1913.....	14	1,817	274	504	314	2,909	90	0	4	11	105
" 10.—" 1, 1913.....	20	4,005	1,021	1,810	6,536	13,372	454	56	43	115	668
" 11.—" 1, 1913.....	6	13,470	288	76	1,434	15,268	958	408	0	93	1,459
Total	209	42,992	4,148	8,689	17,747	73,576	7,627	1,766	5,209	668	15,270

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin and Minnesota lines; Group 7—Montana, Wyoming, Nebraska, North Dakota and South Dakota lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Washington, Oregon, Idaho, California, Nevada and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages, 1907 to 1913.

cellaneous car shortage is in groups 1 (New England lines), 3, 4, 6, 9 and 11 (as above). The decrease in coal car shortage is in all groups, except 2 (New York, New Jersey, Delaware, Maryland and eastern Pennsylvania), and 9 (as above).

Compared with the same date of 1912; there is an increase in the total surplus of 37,529 cars, of which 28,812 is in box, 2,295 in flat, 3,396 in coal and 3,026 in miscellaneous car surplus. There is a decrease in the total shortage of 11,027 cars, of which 7,280 is in box, 1,413 in flat, 1,799 in coal and 535 in miscellaneous car shortage.

The accompanying table gives car surplus and shortage figures by groups for the last period covered in the report and the diagram shows total by-weekly surpluses and shortages from 1907 to 1913.

Traffic Club of New York.

At the regular meeting of the Traffic Club of New York, to be held September 30, J. W. Erwin will deliver an illustrated lecture entitled Through the Sunny Southland to California's Golden Gate. At this meeting the nominating committee will be selected.

The Haworth Country Club, Haworth, N. J., has extended to the members of the Traffic Club of New York the privileges of its golf course and club house for Wednesday, September 17. Prizes have been authorized and will be open to competition between members of the club only. Provision has been made for the entertainment of the ladies, including a ladies' contest.

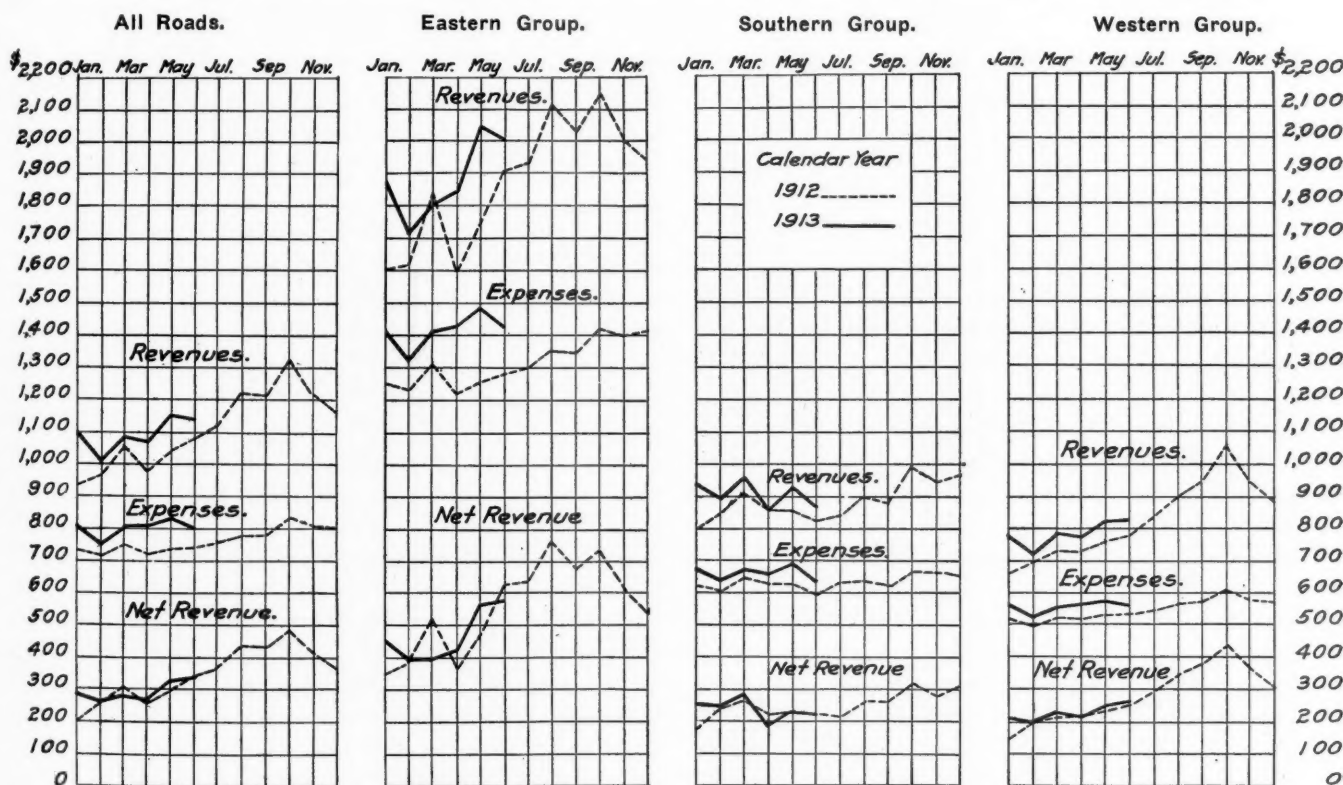
Summary of Revenues and Expenses of Steam Roads in June.

The Bureau of Railway Economics' summary of revenues and expenses and comments thereon for June, 1913, are as follows: The railways whose returns are included in this summary operate 222,248 miles of line, or about 90 per cent. of the steam railway mileage in the United States. Total operating revenues for the month of June, 1913, amounted to \$253,356,489. Compared with June, 1912, the total operating revenues show an

The operating ratio for June was 70.4 per cent., which is comparable with 71.9 per cent. in May, 1913, and 68.5 per cent. in June, 1912.

The railways of the eastern district show an increase in total operating revenues per mile of line as compared with June, 1912, of 5.6 per cent., the railways of the southern district an increase of 5.4 per cent., and the railways of the western district an increase of 7.0 per cent. Operating expenses per mile increased 11.8 per cent. on the eastern railways, 7.2 per cent. on the southern railways, and 6.5 per cent. on the western railways. For the eastern railways net operating revenue per mile decreased 7.2 per cent., for the southern railways it increased 0.6 per cent., and for the western railways it increased 7.9 per cent. The increase in taxes per mile was 14.2 per cent. in the eastern district, 3.9 per cent. in the southern district, and 2.2 per cent. in the western district. Operating income per mile decreased 11.0 per cent. in the East, increased 0.5 per cent. in the South, and increased 9.3 per cent. in the West.

When the returns for the six months of the calendar year 1913 are compared with those of the corresponding months of 1912, they show an increase in total operating revenues per mile of 8.8 per cent., an increase in operating expenses per mile of 9.9 per cent., and an increase in net operating revenue per



Monthly Revenues and Expenses Per Mile of Line in 1912 and 1913.

increase of \$15,992,193. These total operating revenues per mile of line averaged \$1,140 in June, 1913, and \$1,076 in June, 1912, an increase of \$64, or 5.9 per cent. Freight revenue per mile increased 6.7 per cent. and passenger revenue per mile 5.5 per cent.

Operating expenses amounted to \$178,394,784. This was \$15,744,779 more than for June, 1912. These operating expenses per mile of line averaged \$803 in June, 1913, and \$737 in June, 1912, an increase of \$65 per mile, or 8.9 per cent.

Net operating revenue amounted to \$74,961,705. This was \$24,741,414 more than for June, 1912, but this increase is due to the increase in mileage. Net operating revenue per mile of line averaged \$337 in June, 1913, and \$339 in June, 1912, a decrease of \$1.42 per mile, or 0.4 per cent.

Taxes for the month of June amounted to \$11,057,121, or \$50 per mile, an increase of 7.2 per cent. over June, 1912.

Operating income averaged \$287 per mile of line, and in June, 1912, \$293, thus decreasing \$5.64, or 1.9 per cent. Operating income for each mile of line for each day in June averaged \$9.57 and for June, 1912, \$9.76.

mile of 5.8 per cent. This net operating revenue per mile increased 2.5 per cent. in the eastern district as compared with the corresponding period of the previous year, increased 6.2 per cent. in the southern district, and increased 9.4 per cent. in the western district.

The diagram shows the variation in operating revenues, operating expenses and net operating revenue per mile for the separate months of the calendar year 1912 and of the calendar year 1913 to date. The following table shows the per cent. of operating revenues consumed by each class of expenses:

	PER CENT. OF TOTAL OPERATING EXPENSES.					
	June		Fiscal year ended June 30		Calendar year ended December 31	
	1913.	1912.	1913.	1912.	1912.	1911.
Maintenance of way and structures	14.9	14.7	13.3	12.7	12.8	12.7
Maintenance of equipment.....	16.2	15.2	16.4	15.9	16.0	15.7
Traffic expenses	2.2	2.2	2.0	2.1	2.0	2.1
Transportation expenses	34.3	33.9	35.2	35.9	35.5	35.4
General expenses	2.8	2.5	2.4	2.5	2.4	2.5
Total operating expenses.....	70.4	68.5	69.3	69.1	68.7	68.4

Regulating the Cotton Export Traffic.

The Liverpool Bill of Lading Conference Committee is to assume the management and support of the central bureau to receive, inspect and record American bills of lading. Final action has been taken this summer by the European cotton interests toward the permanent organization of the bureau, with a view to affording full protection for the cotton trade against forged documents.

The practicability and the efficiency of the central bureau have been demonstrated during the last two years. The co-operation of the cotton carrying railroads has been unanimous, 116 roads having signed the agreement with the Liverpool committee and the American Bankers' Association. As a result of the constant scrutiny of the bills of lading forwarded to the central bureau and the checking up of all inaccuracies by notices to the roads, the issuing agents have become educated until greater accuracy has been obtained in the issuance of cotton bills than has ever before been approximated.

In view of the fact that European accepting bankers carry cotton drafts far longer than the discounting banks on this side, it is believed that their request for protection, addressed to the American exchange buyers, will be generally and cordially acceded to, and that the American bankers will, in turn, ask the cotton shippers to instruct the railroads to forward copies of their through bills of lading to the central bureau.

INTERSTATE COMMERCE COMMISSION.

The commission has suspended from September 19 until March 19, Agent Countiss' tariff, which contains advances in rates on wheat in carloads from interstate points to points in Arizona and New Mexico.

Commissioner Prouty held a hearing at Chicago last week on complaints filed by a number of grain dealers against a proposed advance of one cent per 100 lbs. in rates on grain from Illinois points to New York.

The commission has suspended from September 29 until March 29, the schedules contained in certain tariffs, which proposed to advance rates on brick in carloads from Athens and other points in Ohio to Huntington, W. Va.

The commission has suspended from September 27 until March 27, the tariffs of the Southern Railway which proposed to advance rates on lumber in carloads from shipping points located on the Southern Railway in Tennessee, North and South Carolina and Georgia to Virginia cities, eastern seaboard and interior eastern points.

The commission has suspended from September 29 until March 29, the operation of the schedules in the tariffs of W. H. Hosmer, agent, which propose to increase rates applicable to the transportation of scrap iron and old rails in carloads between St. Paul and Duluth, Minn., and Chicago, St. Louis, Mo., and points taking the same rates.

The commission has suspended from September 20 until March 20, the note in Agent Leland's tariff and Agent W. A. Poteet's tariff, which would increase from 1 to 6 cents per 100 lbs. rates applicable to the transportation of potatoes and vegetables in carloads from points in Texas, Louisiana and Arkansas to Denver, Col., and points taking Denver rates.

Chairman E. E. Clark, of the Interstate Commerce Commission, held a hearing at Chicago on September 4, on a complaint instituted by the Elgin Commercial Club, alleging discrimination in the rates between Elgin, Ill., and eastern points in comparison with the rates to Aurora, Ill. Elgin is now on a 110 per cent. basis from New York, while Aurora has a 104 per cent. basis.

The commission has suspended from September 10 until January 8 the item in a supplement to the tariff of the Chicago, Milwaukee & St. Paul, which contains a proposed increase of 20 cents per gross ton, applicable to the transportation of scrap iron in carloads between Chicago and Milwaukee, Wis., the present rate being 50 cents per gross ton and the proposed rate 70 cents per gross ton.

The commission has strengthened the Board of Valuation Engineers by appointing four district engineers, and later will appoint a fifth. The four who have been appointed are: John Y. Bayless, Lynchburg, Va.; Dewitt V. Moore, consulting engineer, Indianapolis, Ind.; C. C. Witt, engineer of the Kansas Railroad Commission, and Frank Rhea, formerly with the Pennsylvania Lines, and more recently with the General Electric Company.

The commission has suspended from September 10 until January 8 the operation of an item in a supplement to Agent R. H. Countiss' tariff, which proposes to increase rates applicable to the transportation of canned apples in carloads from Portland, Ore., and other North Pacific Coast points to St. Louis, Chicago, St. Paul and points west thereof, including Wichita and Topeka, Kan. The present rate is 65 cents per 100 lbs., carload minimum weight 60,000 lbs.; the proposed rate is 85 cents per 100 lbs., carload minimum weight 40,000 lbs., an advance of 20 cents in the rate.

The commission has suspended from September 10 until January 8 the tariff of the Union Pacific, which names through rates applicable to the transportation of bananas and cocoanuts in carloads from New Orleans, Port Chalmette, Louisiana and Mobile, Alabama, to points in the states of Idaho, Oregon, Utah and Wyoming, and cancels the application of through rates in connection with the Chicago, Rock Island & Gulf, Colorado & Southern, Fort Worth & Denver City, and the Trinity & Brazos Valley, which in effect compels the movement of this traffic via Kansas City and other Missouri River gateways and thence over the lines of the Union Pacific west. Heretofore in connection with rates named in a prior issue of the above tariff, routing was provided as follows: via Texas & Pacific—Fort Worth, Texas; Fort Worth & Denver City—Sixelo, New Mexico; Colorado & Southern—Denver, Col., thence via Union Pacific and connections to destination. All other routes via Denver, Colorado, excepting the Union Pacific, have been cancelled, and it is claimed by protestants that the cancelled routes are most desirable for this traffic and the application of combination rates via such routes would result in material increases in rates.

STATE COMMISSIONS.

The California Railroad Commission has issued an order to the Pullman Company to appear on November 19 and explain its rules and regulations, especially those governing porters and their conditions of employment.

Everett E. Stone, of Springfield, has been appointed a member of the Massachusetts Public Service Commission, succeeding George P. Lawrence, former Congressman, who resigned. The appointment is for a three-year term. Mr. Stone was formerly division engineer of the Boston & Albany, and had been mayor of Springfield.

A hearing was held on September 8 at Chicago before the Illinois Railroad and Warehouse Commission on a complaint of the Chicago Board of Trade against the Atchison, Topeka & Santa Fe, Chicago & Alton, Chicago & Eastern Illinois, Illinois Central and Wabash, because these lines have declined to enter into the Chicago reciprocal switching agreement under which switching charges on cars of Illinois grain in the Chicago switching district are absorbed by the other roads.

The Public Service Commission of Missouri has issued an order prohibiting railways from charging more than two cents a mile for passengers who pay fare in cash on trains. The railways, however, will be allowed to collect a penalty of 10 cents from passengers paying on the train, the amount to be refunded on application at the general offices. The railways have been charging three cents a mile for fares paid on the train. The commission has also issued an order that on shipments over two or more lines of railway mileage rates shall be figured from point of origin to final destination and based on the state rate for the entire distance, instead of a combination of the rates prescribed for each line; such rates are not to cover switching charges at points of origin or destination performed by lines other than those performing the road service.

Railway Officers.

Executive, Financial and Legal Officers.

C. A. Chapman has been appointed auditor of the Nevada Copper Belt, with headquarters at Salt Lake City, Utah, succeeding F. J. Sullivan, transferred. (See Traffic Officers.)

W. F. Bull, chief clerk to the chairman of the executive committee of the Southern Pacific, at New York, has been appointed assistant secretary of the Southern Pacific and the Louisiana Western, with headquarters at New York, succeeding Joseph Hallen, resigned.

Operating Officers.

Fred W. Souerby has been appointed supervisor of demurrage and weighing of the Illinois Central and the Yazoo & Mississippi Valley, with headquarters at Chicago. Effective September 10.

Otto Holstein, operating manager of the Central Railway of Peru, with office at Lima, Peru, has been appointed superintendent of transportation of the Guayaquil & Quito, with office at Huigra, Ecuador, South America.

G. A. Stokes, superintendent of the Toronto terminals of the Grand Trunk, at Toronto, Ont., has been appointed division agent and W. H. Farrell, superintendent of freight service at Montreal, Que., has been appointed superintendent of the Toronto terminals, succeeding Mr. Stokes.

C. L. French, superintendent of the Connellsville division of the Baltimore & Ohio, at Connellsville, Pa., has been appointed assistant general superintendent of the Pittsburgh system, with headquarters at Pittsburgh, Pa. O. L. Eaton, assistant superintendent of the Connellsville division, at Somerset, has been appointed superintendent with headquarters at Connellsville, and S. C. Wolfersberger, supervisor of transportation of the Pittsburgh system, has been appointed assistant superintendent, with headquarters at Somerset.

James Paul Stevens, whose appointment as general superintendent of the Virginia general division of the Chesapeake & Ohio, with headquarters at Richmond, Va., has been announced in these columns, was born on December 28, 1885, at Peru, Ind., and was educated in the common schools. He began railway work in January, 1901, on the Chesapeake & Ohio, as clerk to the chief dispatcher at Hinton, W. Va., and has been in the continuous service of that road ever since. He was later copy operator in the dispatcher's office and extra dispatcher at Richmond, Va. In January, 1904, he was appointed assistant trainmaster on the Cincinnati division at Covington, Ky.; the following May he became chief dispatcher, and was promoted to assistant superintendent in February, 1907, becoming superintendent in January, 1908, of the same division, with headquarters at Covington. He was appointed general superintendent of the Kentucky general division in May, 1910, with headquarters at Covington, which position he held at the time of his recent appointment as general superintendent of the Virginia general division of the same road, as above noted.

To reduce the territory covered by the general superintendent the New York, New Haven & Hartford will hereafter be operated in two grand divisions. All the lines east of Willimantic, Conn., and New London, and comprising the Boston, Providence and Old Colony divisions will be known as the Eastern Grand division. All the lines west of those points, comprising the Midland, Western and the present Shore Line divisions, will hereafter be known as the Western Grand division. The present Shore Line division is divided and a new division covering the main line west of New Haven and the Danbury and New Canaan branches has been created to be known as the New York division, with headquarters at Harlem River, N. Y. The Shore Line division will cover the lines between New Haven and Springfield, and New Haven and New London, including the Northampton branch. John A. Droegge, superintendent of the Shore Line division at New Haven, Conn., has been appointed general superintendent in charge of the operation of the Western Grand division, with office at New Haven. A portrait of Mr. Droegge, and a sketch of his railway career were published in the *Railway Age Gazette* of December 20, 1912, page 1231.

Clayton N. Woodward, general superintendent at Boston, Mass., has been appointed general superintendent in charge of the Eastern Grand division, with office at South Station, Boston. Charles H. Motsett, freight trainmaster, at Harlem River, N. Y., has been appointed superintendent of the New York division, with office at Harlem River. William H. Foster, superintendent of the Old Colony division at Taunton, Mass., has been appointed superintendent of the Shore Line division, with office at New Haven. Harry C. Oviatt, assistant mechanical superintendent at New Haven, has been appointed superintendent of the Old Colony division, with office at Taunton, Mass. The office of James O. Halliday, master of transportation at New Haven, has been abolished, and he has been appointed assistant to the general manager. Donald French Stevens, trainmaster of the Third division of the Shore Line at New Haven, succeeds Mr. Motsett as trainmaster at Harlem River, and John Flick, assistant trainmaster, succeeds Mr. Stevens.

C. L. French, who has been appointed assistant general superintendent of the Pittsburgh system of the Baltimore & Ohio, with headquarters at Pittsburgh, Pa., was born on December 27,



C. L. French.

1866, at Cumberland, Md., and graduated from Allegheny County High School. He began railway work on October 1, 1883, as a messenger in the train dispatcher's office on the Cumberland division of the Baltimore & Ohio, and has been in the continuous service of that road ever since. He was later appointed operator and then train dispatcher. On June 1, 1899, he was made chief dispatcher, which position he held until August 1, 1902, when he was appointed assistant trainmaster. He then became trainmaster at Cumberland, Md., remaining in that position until April, 1910, when he was made

superintendent of the Connellsville division, which position he held at the time of his recent appointment as assistant general superintendent of the Pittsburgh system of the same road.

Traffic Officers.

C. C. Womble has been appointed soliciting freight agent of the Gulf, Colorado & Santa Fe at Waco, Tex.

The headquarters of S. H. Dare, general western freight agent of the Atlantic Coast Line at Cincinnati, Ohio, have been transferred to Chicago.

F. B. Choate, general agent of the freight department of the Union Pacific at Denver, Colo., has been appointed assistant general freight agent at that place.

L. B. Dickie, contracting freight agent of the Chicago, Milwaukee & St. Paul, has been appointed contracting freight agent of the Kansas City, Mexico & Orient at Chicago.

L. B. Limming, commercial freight agent of the Baltimore & Ohio at Omaha, Neb., has been appointed traveling freight agent at that point. A. J. Anderson succeeds Mr. Limming.

W. J. Faherty, westbound contracting freight agent of the Wabash at Chicago, has been transferred to New York as contracting freight agent. A. D. Heaphey succeeds Mr. Faherty.

F. J. Sullivan, auditor of the Nevada Copper Belt, at Salt Lake City, Utah, has been appointed traffic manager and superintendent, with headquarters at Mason, Nev., succeeding G. M. Fraser, deceased.

The agency of the Erie Despatch at Cedar Rapids, Iowa, was abolished, on September 1, and the territory heretofore covered by that agency is now under the jurisdiction of D. L. Porch, agent at Davenport, Iowa.

V. A. Blewett, traveling freight agent of the Rock Island Lines at Los Angeles, Cal., has been appointed commercial agent, with headquarters at Los Angeles, succeeding B. F. Coons, resigned to engage in other business.

M. J. Dooley, freight agent of the Sunset Central Lines of the Southern Pacific, at Shreveport, La., has been appointed general agent at that place, succeeding A. W. Cheesman, resigned, whose title was division freight and passenger agent. The latter office is abolished.

F. J. Burke, division freight agent of the International & Great Northern, at Dallas, Tex., has been appointed assistant general freight agent in charge of solicitation, with headquarters at Dallas. Guy A. Deuel, division freight agent at El Paso, Tex., succeeds Mr. Burke. D. L. Ray, commercial agent at Paris, Tex., takes the place of Mr. Deuel. A. B. Waldron, traveling freight agent, with headquarters at Ft. Worth, Tex., succeeds Mr. Ray, and C. B. Fox succeeds Mr. Waldron.

G. K. Caldwell, assistant general freight agent of the Southern Railway at Atlanta, Ga., has been appointed general freight agent, with headquarters at Washington, D. C., and B. G. Brown has been appointed assistant general freight agent, with office at Atlanta, Ga.; E. C. Rankin has been appointed traveling freight agent, with office at Columbia, S. C., and A. C. Izard, freight soliciting agent at Rock Hill, S. C., having resigned to engage in other business, that agency has been abolished.

W. H. Underwood, whose appointment as assistant to the passenger traffic manager of the New York Central Lines West, with headquarters at Chicago, has already been announced in these columns, was born May 6, 1858, at Rochester, N. Y., and began railway work in 1874. He was a clerk in the office of the assistant general superintendent of the Michigan Central and clerk in the city ticket office of the Canada Southern at Detroit, Mich., until July, 1878, when he was made city passenger and ticket agent of the Wabash in that city. In April, 1883, he was appointed western passenger agent of the Michigan Central at Chicago, and four years later he became general eastern passenger agent at Buffalo, N. Y. He was promoted to assistant general passenger agent of the latter road in April, 1905, which position he held until his recent appointment as assistant to the passenger traffic manager of the New York Central Lines West, as above noted.

George Kearsley Caldwell, who has been appointed general freight agent of the Southern Railway, with headquarters at Washington, D. C., was educated in the grammar schools, and began railway work in 1894, with the East Tennessee, Virginia & Georgia, remaining with that road until it was taken over by the Southern Railway. He then held various clerical positions in the general freight office of the Southern until April 1, 1903, when he became chief rate clerk in the general freight department of the Central of Georgia. From November, 1905, to February, 1907, he was chief clerk in the general freight department of the Southern Railway, and then was chief clerk to the freight traffic manager until September, 1908, when he became chief clerk to the vice-president in charge of traffic of the same road. In June, 1911, he was promoted to division freight agent at Columbus, S. C., and on September 1, 1912, became assistant general freight agent at Atlanta, Ga., which position he held at the time of his recent appointment as general freight agent of the same road as above noted.

The jurisdiction of L. D. Knowles, assistant general freight agent of the Missouri Pacific and the St. Louis, Iron Mountain & Southern, at Omaha, Neb., has been extended over the Denver & Rio Grande and the Western Pacific. Dan Jacobs, assistant general freight and passenger agent of the St. Louis, Iron Mountain & Southern at Alexandria, La., has been appointed assistant general freight agent of that road, and the Missouri Pacific, Denver & Rio Grande and Western Pacific at that place. R. M. McWilliams, assistant general freight agent of the Missouri Pacific and St. Louis, Iron Mountain & Southern at Little Rock, Ark., will also have jurisdiction over the Denver & Rio Grande and Western Pacific. The jurisdiction of J. B. Trimble, heretofore general eastern freight agent of the Missouri Pacific-Iron Mountain system at New York, has been extended over the Denver & Rio Grande and the Western Pacific. The following general agents of freight department

have jurisdiction over the four roads mentioned above: W. C. Staley, Chicago; W. H. Reed, New Orleans, La.; J. O. Barkley, St. Joseph, Mo.; C. C. McCarthy, Pittsburgh, Pa.; F. C. Gifford, Kansas City, Mo.; J. L. Amos, St. Louis, Mo.; L. M. White, Detroit, Mich.; C. B. Brownell, Natchez, Miss.; C. S. Blackman, Hot Springs, Ark.; A. S. Edmonds, Philadelphia, Pa.; T. A. Helm, Dallas, Tex. J. E. Woodfin is made assistant general agent of the freight department at Ft. Worth, Tex. H. S. Drysdale is appointed New England freight agent at Boston, Mass. J. D. Kenworthy, assistant general freight agent of the Denver & Rio Grande at Pueblo, Colo., will hereafter have jurisdiction also over the Western Pacific, Missouri Pacific and St. Louis, Iron Mountain & Southern, and the following are appointed general agents, freight department, of all four roads: J. E. Courtney, Denver, Colo.; J. J. Kavanaugh, Salt Lake City, Utah; W. B. Kenney, Grand Junction, Colo.; S. M. Brown, Leadville, Colo.; J. M. Norton, Seattle, Wash.; E. S. Blair, Los Angeles, Cal.; W. C. McBride, Portland, Oregon. In the passenger traffic department the representation of the four roads is as follows: General agents passenger department, Ellis Farnsworth, Chicago; J. M. Cloyes, Kansas City; J. A. Steltenkamp, Cincinnati; J. M. Griffin, St. Louis; T. F. Godfrey, Omaha, Neb.; C. K. Bothwell, Wichita, Kan. Garland Tobin is made southwestern passenger agent at San Antonio, Tex.; J. O. Barkley, general agent at St. Joseph, Mo.; Wm. E. Hoyt, general eastern passenger agent at New York, and H. A. Cooper, district passenger agent at Joplin, Mo.

Engineering and Rolling Stock Officers.

I. H. Farmer has been appointed right of way engineer of the Seaboard Air Line, with office at Portsmouth, Va., succeeding G. H. Earp, promoted.

R. F. Williams has been appointed division engineer of the San Antonio division of the International & Great Northern, with headquarters at San Antonio, Tex.

J. J. Hess, division roadmaster of the Great Northern at Whitefish, Mont., has been appointed assistant engineer maintenance of way, with office at St. Paul, Minn.

W. R. Powrie has been appointed district engineer of the Chicago, Milwaukee & St. Paul, with office at Minneapolis, Minn., in place of M. D. Rhame, retired on account of ill health. Effective September 17.

George W. Robb, master mechanic of the Grand Trunk Pacific, at Transcona, Man., has been appointed superintendent of motive power, with headquarters at Transcona, and his former position has been abolished.

R. W. Schulze, who recently resigned as general car foreman of the Gulf, Colorado & Santa Fe, at Cleburne, Tex., has been appointed superintendent of the car department of the St. Louis & San Francisco, with headquarters at Springfield, Mo.

C. J. Stewart, master mechanic of the New York, New Haven & Hartford, at South Boston, Mass., has been appointed assistant mechanical superintendent, succeeding H. C. Oviatt, promoted, and G. A. Moriarty, master mechanic at Providence, R. I., succeeds Mr. Stewart.

S. L. Wonson has been appointed assistant bridge engineer of the Missouri Pacific, with office at St. Louis, Mo., and G. B. Bagley has been appointed assistant engineer, with office at Kansas City, succeeding G. W. Payne, transferred to the valuation department at St. Louis.

W. O. Houston, division engineer of the Michigan Central at St. Thomas, Ont., has been appointed division engineer at Jackson, Mich., with jurisdiction over the Grand Rapids, South Haven and Allegan divisions and the main line from the westerly limits of the Detroit yards to the easterly limits of the Niles yard. S. D. Williams, Jr., acting division engineer at Niles, Mich., succeeds Mr. Houston.

C. H. Reid, master mechanic of the Western division of the New York, New Haven & Hartford, at Waterbury, Conn., has been appointed master mechanic of the Providence division, with office at Providence, R. I. F. W. Nelson, general road foreman of engines at New Haven, Conn., has been appointed master mechanic of the Western division, with office at Waterbury, Conn.

J. McCabe, master mechanic at Harlem River, N. Y., has been appointed master mechanic of the New York division, with office at Harlem River. E. W. Alling, master mechanic of the Old Colony division, at Taunton, Mass., has been appointed master mechanic of the Shore Line division, with office at New Haven, succeeding W. S. Clarkson, resigned, and J. H. Daley, road foreman of engines of the Shore Line division, has been appointed master mechanic of the Old Colony division, with office at Taunton, Mass.

Purchasing Officers.

R. A. Klock has been appointed general tie and timber agent for the Intercolonial and the Prince Edward Island railways, with headquarters at Moncton, N. B.

D. Downing, heretofore general storekeeper of the Wheeling & Lake Erie, at Ironville, Ohio, has been appointed general storekeeper of the Chicago & Alton, with headquarters at Bloomington, Ill., succeeding C. B. Foster, resigned.

Floyd Kirkland Mays, who was recently appointed purchasing agent in addition to his duties as treasurer of the Atlanta, Birmingham & Atlantic, with headquarters at Atlanta, Ga., was



F K Mays.

born on December 10, 1884, at South Boston, Va., and was educated in the common schools at Danville. He began railway work on April 2, 1903, as a stenographer in the office of the yardmaster of the Southern Railway at Danville, and in February, 1905, became stenographer in the office of the general agent and superintendent of the Southern Railway and the Chesapeake Steamship Company at Norfolk. On June 15, 1909, he was appointed secretary to the general manager of the Norfolk & Southern at Norfolk, and in August, 1912, became chief clerk to the general manager of the Atlanta, Birmingham & Atlantic at Atlanta, Ga. He was appointed treasurer for the receivers of the A. B. & A. on February 1, 1913, and now becomes also purchasing agent of the same road, also the Georgia Terminal Company and the Alabama Terminal Railroad, with headquarters at Atlanta.

Special Officers.

Maurice A. Welsh has been appointed chief special agent of the Waterloo, Cedar Falls & Northern, with office at Waterloo, Iowa. H. R. Parker succeeds Mr. Welsh as special agent at Waterloo.

OBITUARY.

Judge J. McD. Trimble, formerly general counsel of the Kansas City, Mexico & Orient, died at his home in Kansas City, Mo., on September 13, aged 62 years.

THE SECOND SIMPLON TUNNEL.—A correspondent writes: The boring of the second gallery of the Simplon tunnel is advancing steadily, 1,367 workmen being employed in the tunnel itself, and 816 outside it—in all on an average 2,183 per day. The work is in the hands of the Swiss Federal Railways, and is being supervised by Chief Engineer Rothpletz, who was also the chief engineer of the Loetschberg tunnel. Originally there was talk of handing over the contract for the work to a German firm, whose tender was lower than that of any Swiss firm, but owing to the outcry raised by the Swiss engineers, and more or less by the Swiss in general, the Federal railways decided to be their own contractors.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

THE CHICAGO & ILLINOIS MIDLAND is in the market for two 100-ton consolidation locomotives.

THE NORFOLK & WESTERN has ordered 24 electric locomotives from the Baldwin Locomotive Works and the Westinghouse Electric & Manufacturing Company.

THE MOND NICKEL COMPANY, Coniston, Ont., has ordered 1 mogul locomotive from the American Locomotive Company. The dimensions of the cylinders will be 20 in. x 26 in., the diameter of the driving wheels will be 50 in., and the total weight in working order will be 156,000 lbs.

CAR BUILDING.

THE PHILADELPHIA & READING is reported to be in the market for about 50 passenger coaches.

THE ERIE is in the market for 7 postal cars, and is having 1,800 freight cars rebuilt by the American Car & Foundry Company.

THE NORTHERN PACIFIC, mentioned last week as being in the market for 40 refrigerator cars and 12 baggage cars, is also in the market for 31 coaches and 16 mail cars.

THE GREAT NORTHERN has ordered 125 passenger cars from the Pullman Company and the Barney & Smith Car Company. The Pullman company will build the postal cars and the Barney & Smith Car Company will build all the other cars.

IRON AND STEEL.

THE MISSOURI, KANSAS & TEXAS has ordered 7,500 tons of rails from the Pennsylvania Steel Company.

THE SOUTHERN PACIFIC has ordered 15,000 tons of rails from the Tennessee Coal, Iron & Railroad Company.

GENERAL CONDITIONS IN STEEL.—Conditions in the steel industry continue to be very much the same. Consumers in general are showing no tendency to place heavy orders in the immediate future, but the railroads are beginning to enter the market again with large orders for 1914 requirements. It is expected that a large volume of orders from this source will be placed during the next month. The mills are operating at about the same rate of capacity, namely, 90 per cent.

NEW LOCOMOTIVE ENGINE.—We were much gratified a day or two since by a visit to the machine shop of William B. James, No. 40 Eldridge street, where we saw in operation on a short temporary railway in his yard, a locomotive engine constructed upon an entirely different plan from any that we have before seen. No part of the engine except the boiler and smoke pipe is over 39 in. above the surface of the rails, and it is so constructed that no fire falls from the furnace nor is a spark even seen to rise from the smoke pipe. The cylinders are on the outside and below the top of the wheels. It is to carry its own fuel and water, and the fire is driven by a bellows worked by the machinery, and therefore is always in proportion to the velocity. It is estimated to weigh, with the supply of water and fuel on board, 3½ tons, and to run from thirty to forty miles an hour. Its power is equal to 16 horses. To give some idea of the ease with which it is controlled when under way, we saw it run a distance of about 50 ft. forward and backwards eight times in 63 seconds, including stops. Mr. James placed it upon wheels without flanges a few days since and ran it over the pavements on Third avenue to Yorkville, about five miles, took breakfast and then returned to the city. The performance, he said, was altogether satisfactory. He has it in contemplation to take it to Baltimore in a few days to give it a fair trial. It will be found, we predict, an ingenious and valuable addition to those already in successful operation on their railroads. We wish Mr. James success, for his plan is called the American.—*From the American Railroad Journal, October 20, 1832.*

Supply Trade News.

The American Machinery Company, manufacturers' agents for machinery and supplies, Salt Lake City, Utah, desires to receive catalogs and prices of machinery and supplies.

Charles N. Replogle, superintendent of the Cambria Steel Company, has been made works manager of the Ralston Steel Car Company, New York, with office in Columbus, Ohio.

The Isthmian Canal Commission will receive bids until October 6 on miscellaneous supplies, including motor driven centrifugal pumps, traveling cranes, air compressors, etc. Circular No. 796.

The American Locomotive Company has received an order for one rotary snow plow from the Corbin Coal & Coke Company, Spokane, Wash. This plow will have 17 in. x 22 in. cylinders, and a 10 ft. 7 in. cut scoop wheel.

The United Engineering & Construction Company, Schofield building, Cleveland, Ohio, desires to receive catalogs from manufacturers of material and equipment covering civil, mechanical and architectural engineering.

Page Harris, superintendent of transportation of the Texas & Pacific, has been made vice-president of the National Lumber & Creosote Company, Texarkana, Ark., with office in Houston, Tex., succeeding G. F. Cotter, resigned.

Beaudry & Company, Inc., Boston, Mass., has perfected a direct connected motor drive for its Beaudry Champion and Beaudry Peerless power hammers, and is now arranging to carry a complete stock of motor driven hammers in addition to belt-driven hammers.

The H. W. Johns-Manville Company, New York, has opened a branch office at Galveston, Tex., where a warehouse will be maintained, from which the stock will be distributed throughout Texas. This firm has two other branch offices in Texas, one at Houston and one at Dallas.

The Beaver Dam Malleable Iron Company, Beaver Dam, Wis., on Tuesday, September 16, filed a voluntary petition in bankruptcy in the federal court at Milwaukee. Liabilities are placed at \$500,000, and assets at \$650,000. Ernest E. Smythe, of Milwaukee, was appointed receiver.

G. S. Turner, for the last four years connected with the Crane Company, has been made second vice-president of the Chas. R. Long, Jr., Company, manufacturers of railway paints. Mr. Turner will also represent Harry Vissering & Co., having been made second vice-president of that company. His office will be at 20 West Jackson boulevard, Chicago, Ill. Mr. Turner was for more than ten years associated with the Southern Railway in the capacity of general foreman, superintendent of shops and general inspector of equipment.

Asbestos Protective metal, made by the Asbestos Protective Metal Company, Beaver Falls, Pa., has been standardized by the Pennsylvania Railroad for the enclosing of all buildings on its lines using sheet metal roofing or siding, except those of a most temporary character. This product is made for the Pennsylvania Railroad in special colors to match the standard color scheme of that company. Recent orders from the Pennsylvania Railroad include a freight station at Harrisburg, freight sheds at Uniontown, dock buildings at Baltimore, and pier 29, North river, New York.

TRADE PUBLICATIONS.

CARBON STEEL.—The Carbon Steel Company, Pittsburgh, Pa., has published a small booklet describing its various kinds of steels, and showing the uses for which each is best adapted.

FUEL OIL.—Tate-Jones & Company, Inc., Pittsburgh, Pa., has published circular No. 142, entitled Fuel Oil Data. This circular tells of the advantages of fuel oil over coal for a variety of purposes.

SIGNALING AND TRAIN DESPATCHING.—The Northey-Simmen Signal Company, Ltd., Indianapolis, Ind., has published an il-

lustrated folder describing the Simmen system of railway signaling and train despatching.

WELDING.—The Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has published an illustrated booklet entitled Electric Arc Welding Processes, which is a reprint of an article by C. B. Auel, in the *American Machinist*.

SECOND HAND EQUIPMENT.—Booth & Flinn, Ltd., Pittsburgh, Pa., have published bulletin G enumerating their variety of second hand railway equipment on hand, including boilers, cars, excavators, hoists, locomotives, locomotive cranes, rails, etc. Prices are given.

TRACK APPLIANCES.—The Railroad Supply Company, Chicago, has issued the sixth edition of its pocket booklet on "Track," which describes and illustrates a large number of appliances handled by this company for use in contract work, together with a number of interesting tables and specifications of use to the track man.

LOCOMOTIVE FURNACE.—The American Arch Company, New York, has published an illustrated booklet entitled The Locomotive Furnace, giving the fundamental principles of combustion, and describing the Gaines locomotive furnace and telling what it will do. The booklet includes instructions for the care of these furnaces.

WATERPROOFING.—The Barrett Manufacturing Company, New York, has published an illustrated booklet entitled The Largest Terminal in the World and How It Was Waterproofed, which tells how and why the Grand Central Terminal, New York, was waterproofed with Barrett Specification pitch and Barrett Specification tarred felt.

LOCOMOTIVE CRANES.—The Brown Hoisting Machinery Company, Cleveland, Ohio, has published catalog K, entitled Brown-hoist Locomotive cranes with Grab Buckets. This catalog gives a general description of Brownhoist locomotive cranes of various capacities, and shows by illustrations how the cranes are used in connection with Brownhoist patented grab buckets.

NORTHERN PACIFIC.—The passenger department of this company has published a very attractive illustrated folder describing the scenes along the route of the trip through the Yellowstone Park taken by the members of the American Association of Passenger Agents after their convention, which was held in St. Paul, September 7-9. Members left St. Paul on September 9 and returned on September 18.

STEEL CUTTING.—The Davis-Bournonville Company, Jersey City, N. J., has published catalog bulletin No. 1, on the Oxy-graph, a machine devised for cutting steel in regular forms, following the lines of a drawing placed on a tracing table. It is of pantograph design and is motor propelled so that it can be driven at uniform, predetermined speed best calculated for the thickness of the metal to be cut. This arrangement permits the cutting to be done not only in sharp curves but at right or acute angles.

EAST INDIAN TRACKMEN.—These laborers work patiently, punctually, and efficiently, with due regard to their natural limitations, under the most trying climatic conditions. They are mostly small landowners; their fields yield enough, with little attention, to satisfy their very modest wants and those of their families, while the railway pay enables them to procure some highly-esteemed little luxuries, whether in food, in raiment, or in the personal adornments of their female relatives and dependents. Besides this, in many places they are allowed to grow castor oil and other paying plants on the embankment slopes. In consequence of their contented state of mind—especially under kind and tactful inspectors—strikes are unknown. The climate in which they work ranges from the icy cold of the winter months in the northwest to the terrific scorching winds of the summers in the same regions; from the continuous steaming damp heat of the south to the rainless deserts of the west. The traffic continues more or less all the year round; there are no ice-bound periods when the road cannot be touched, and, moreover, by far the majority of the lines are single track, involving incessant care and watchfulness.

Railway Construction.

BIRMINGHAM-TUSCALOOSA RAILWAY & UTILITIES COMPANY (Electric).—This company, which was organized to build a low-grade line from Birmingham, Ala., southwest via Bessemer to Tuscaloosa, 54 miles, has located the line. The maximum grades will be 7/10 of 1 per cent., and the maximum curvature 4½ deg. A contract for building the line was given some time ago to the Tidewater Construction Company, Birmingham. F. E. Calkins, president, New York. C. R. Carter and W. S. Adams are incorporators. (April 18, p. 925.)

BLACK MOUNTAIN.—This road is now in operation between Black Mountain Junction, N. C., where a connection is made with the Carolina, Clinchfield & Ohio and Pensacola, 20.6 miles.

BUTTE, WISDOM & PACIFIC.—It is understood that this company, which was recently incorporated in Montana, will begin construction work about October 1. The plans call for building from Divide, Mont., up the Big Hole river in Silverbow, Beaverhead and Deerlodge counties, Mont. J. D. Brown, Helena; C. M. McCoy and L. P. Benedict, Butte, are interested. (August 22, p. 353.)

CAROLINA & YADKIN RIVER.—This road has been extended from Thomasville, N. C., northeast to High Point, 6 miles. (March 7, p. 459.)

DETROIT, BAY CITY & WESTERN.—This company, which operates a line from Bay City, Mich., east to Wilmot, 40 miles, is building an extension from Wilmot east to Sandusky, 21 miles. Surveys have been made and right of way has been secured for building a further extension from Sandusky southeast to Port Huron, about 40 miles.

GRAND TRUNK PACIFIC.—Train service has been extended on the Mirror & Calgary subdivision of the Prairie division from Trochu, Alta., south to Beiseker, 41.6 miles, and the Mountain division has been extended from New Hazleton, B. C., south to Morristown, 23.9 miles.

GREENVILLE, BLUE RIDGE & NORTHERN.—Plans are being made to build from a point on the Houston & Texas Central at Anna, Tex., southeast to Greenville, it is said. The line is to be extended eventually to the piney woods section of East Texas. Between Anna and Blue Ridge 12 miles of track has already been laid. W. N. Harrison, Greenville, is back of the project.

HENRYETTA INTERURBAN.—An officer writes that the company plans to begin work at once on a line from Henryetta, Okla., east to Dewar, thence north to Coalton, about 10 miles. Two surveys have been made and the final route will be selected at once. On the completion of this line the company expects to build west from Henryetta to a connection with the Atchison, Topeka & Santa Fe at Sparks, about 50 miles, or to a connection with the Fort Smith & Western at Okemah, about 20 miles. The company expects to develop a large coal and oil tonnage, as the line will traverse a rich coal and oil section. Contracts for building the line have not yet been let. C. H. Kellogg, president, Henryetta. (September 5, p. 436.)

HOUSTON & TEXAS CENTRAL.—The cut-off from Giddings, Tex., northeast via Lebau, Dime Box, Deanville, Caldwell, and Cooks Point, to Stone City, 39.77 miles, has been completed and was opened for business on September 10. (May 9, p. 1052.)

ILLINOIS TRACTION.—This company has under consideration the question of building an extension, it is said, from Clinton, Ill., northeast via Bellflower, Saybrook, Anchor and Fairbury to Kankakee.

IDAHO ROADS (Electric).—According to press reports, financial arrangements are being made to build from Alexander, Idaho, south via Ogden canyon, to Ogden, Utah, about 125 miles. F. W. Crockett, Logan, Idaho, may be addressed.

LOUISIANA & ARKANSAS.—The Jena branch has been extended from Jena, La., east to Jonesville, 13.8 miles.

L'OUTRE RAILROAD.—Incorporated in Louisiana with \$250,000 capital by residents of Monroe, to build from a point in Union

parish, northeast through Ouachita and Morehouse parishes in Louisiana, and Chicot and Desha counties, in Arkansas, to Arkansas City, about 60 miles. F. B. Pierce, president; F. P. Stubbs, Jr., vice-president; A. Wolff, secretary, and L. Bradt, treasurer, Monroe.

MANATAWNY RAILROAD.—An officer writes that contracts have been given to the Highley Construction Company, Pottstown, Pa., to build from connections with the Philadelphia & Reading and the Pennsylvania Railroad at Stowe, Montgomery county, Pa., west two miles to Douglasville, Berks county, thence north, via Amityville to Manatawny iron mines, 8 miles. Grading has been finished on three miles, but no track has yet been laid. The work calls for the excavation of 17,000 cu. yds. a mile. There will be two bridges, each to be 150 ft. long, and two or three temporary trestles. The company expects to develop a traffic in iron ore, limestone and general freight and farm products. M. J. Person, president, A. E. Lehman, chief engineer, 506 Walnut street, Philadelphia. (November 29, p. 1063.)

MICHIGAN CENTRAL.—The Allegan division has been extended from Homer, Mich., to Moscow.

NEW ALBANY & FRENCH LICK VALLEY TRACTION.—Organized in Indiana, it is said, to build from New Albany, Ind., west via Mooreville, Greenville, Palmyra, Hardinsburg and Paoli to West Baden Springs and French Lick Springs, 60 miles, with a four-mile branch from Mooreville via Georgetown and Lanesville to Corydon. Surveys have been made. C. S. Hernley, Newcastle, and G. W. Schindler, New Albany, may be addressed.

NEW YORK SUBWAYS.—Bids for the construction of section No. 2, located in Greenwich street, West Broadway and Park Place, in the borough of Manhattan, of the Seventh avenue subway are wanted by the New York Public Service Commission, First district, on October 1. The Seventh avenue extension is to be built from the present subway at Times Square, in the borough of Manhattan, down Seventh avenue and Varick street, West Broadway, Park Place, Beekman street, William street and Old Slip, to and under the East river to a connection with the present subway in the borough of Brooklyn. There will also be a two-track extension from Park Place south to the Battery. North of Park Place it will be a four-track line. When completed, the extension will be operated under the Dual System contracts by the Interborough Rapid Transit Company.

The New York Public Service Commission, First district, has authorized the execution of a contract for the completion of the two additional tracks in the Centre street subway in the borough of Manhattan, connecting the Williamsburg bridge with the station in the basement of the Municipal building at a cost of about \$500,000. Two tracks on this line are already in operation. The New York Municipal Railway Corporation, which is to do the work for the city, expects to begin the work at once and to complete it in 18 months.

NORTH LOUISIANA (Electric).—This company is planning to build a 110-mile line, it is said, from Shreveport, La., east via Minden, Homer, and Arizona to Monroe. A. B. Blevins, president, Jefferson, La.

OIL BELT.—This company, building a line from Charleston, Ill., south via Casey, Bellair, Oblong, Hardinville, Bridgeport, Linn and Patton to Mt. Carmel, about 100 miles, has opened for operation the section from Oblong south to Bridgeport, 25 miles. Connections are made at Oblong with the Illinois Central and at Bridgeport with the Baltimore & Ohio Southwestern. (February 14, p. 313.)

OKLAHOMA & TEXAS CENTRAL.—Organized in Oklahoma to build from Coffeyville, Kan., south to Fort Worth, Tex., about 300 miles. An officer is quoted as saying that grading contracts will be let soon, and that construction work will be started in about 90 days on the section from Tulsa, Okla., north to Coffeyville. W. E. Hawley, president, Tulsa, Okla.; C. H. Cleveland, first vice-president, Skiatook; E. E. Edge, second vice-president, Cleveland, and C. L. Hounker, secretary and treasurer, Tulsa.

OREGON SHORT LINE.—The Teton branch of the Montana division has been extended from Driggs, Idaho, to Victor, 8 miles.

PACIFIC GREAT EASTERN.—An officer of this company, which started work some time ago on a line from Vancouver, B. C., north to the Grand Trunk Pacific at Fort George, about 350 miles, writes that about 170 miles are under construction, and a force of about 4,000 men are now at work. The company has bought 65 acres of land as a site for shops and yards on the north shore of Burrard Inlet, in North Vancouver. (April 11, p. 863.)

SEATTLE, PORT ANGELES & LAKE CRESCENT.—An officer writes that work is now under way from a point near Oak Bay, Wash., west via Irondale, Chimacum valley, Sequim, Dungeness valley and Port Angeles to the Lyre river, and past Lake Crescent into the Olympic timber district. Contracts have been given to the Newman-McHugh Construction Company; Rowan & Anderson and A. R. Swanson, of Port Williams, Wash.; Dunn & Hogan, and Ferch & Gass, of Port Crescent; Cervien & Miller; Swan Peterson; J. E. Anderson; Dennis O'Rourke and H. M. Munger of Port Angeles. The company expects to develop a traffic in forest products and general merchandise. C. J. Erickson, president, Seattle, and C. C. Donovan, chief engineer, Port Angeles. (March 28, p. 779.)

SULTAN VALLEY.—Incorporated in the state of Washington with \$500,000 capital, to build a 30-mile line from Sultan, Snohomish county, Wash., into Sultan basin and the mining district. The incorporators include J. Wigren, F. N. Thayer, and J. C. Davis, Chicago; N. B. Jones, of Sultan, Wash., and E. H. Guie, Seattle.

UNION PACIFIC.—The North Flat branch of the Wyoming division has been extended from Gering, Neb., to Haig, 6.7 miles.

RAILWAY STRUCTURES.

LOS ANGELES, CAL.—The Southern Pacific has practically completed arrangements with the city for the construction of a new passenger station which will cost approximately \$700,000.

MCADAM JUNCTION, N. B.—The new shops now being built by the Canadian Pacific at McAdam Junction include an erecting shop 70 ft. x 129 ft., containing six engine pits, and a machine shop 80 ft. x 129 ft. Both structures are to be of concrete and brick, with steel frames. The work, which will cost over \$100,000, is already well advanced. (July 11, p. 78.)

OGDEN, UTAH.—The Denver & Rio Grande has let a contract for the construction of a freight terminal to cost about \$35,000, to the Continental Contract Company of Ogden. The terminal will include a two story office building and a freight shed 196 ft. long.

SPOKANE, WASH.—A contract has been given to Grant, Smith & Company, Seattle, Wash., for putting up a union station, at Trent street, Spokane, to be used jointly by the Oregon-Washington Railroad & Navigation Company and the Chicago, Milwaukee & St. Paul. The contract includes erecting the steel work on a 1,400-ft. elevated track approach to the station, and putting up umbrella sheds. The station is to be of steel, brick, and stone construction, 52 ft. x 300 ft., and four stories high. The work is to be started at once. The steel for the approach and the station is being furnished by the American Bridge Company.

VANCOUVER, B. C.—See Pacific Great Eastern under Railway Construction.

PUKOW-SINYANG RAILWAY CONCESSION.—A British engineer has been appointed to carry out preliminary surveys of the Pukow-Sinyang railway in China. The concession for the line was granted to the British Chinese Corporation in 1898, but the construction has been repeatedly deferred. The line will cost approximately \$15,000,000, and the preliminary agreement provides as regards security that the terms shall be similar to those of the Shanghai-Nanking Railway, involving the mortgage of the line, foreign accountancy, etc. The surveys will occupy a year. The projected line will link the Peking-Hankow and the Tientsin-Pukow lines, the junction with the latter being effected considerably north of Pukow, and it will constitute a valuable feeder to both railways.

Railway Financial News.

BOSTON & MAINE.—Howard Elliott has been elected a director, succeeding Charles S. Mellen.

BROOKLYN RAPID TRANSIT.—See editorial comments on the annual report in another column.

CHICAGO GREAT WESTERN.—This company has asked the Public Service Commission of Missouri for approval of an issue of \$3,116,000 bonds and an equal amount of 4 per cent. preferred stock to represent the purchase of bonds of the Wisconsin, Minnesota & Pacific.

LAKE SHORE & MICHIGAN SOUTHERN.—White, Weld & Company, Kissel, Kinnicutt & Company, and Harris, Forbes & Company, all of New York, are offering \$11,800,000 Cleveland Short Line first mortgage $4\frac{1}{2}$ per cent. bonds of 1911-1961, guaranteed principal and interest by the Lake Shore & Michigan Southern. The bonds are offered at 95 $\frac{1}{4}$, yielding 4.75 per cent. on the investment. These bonds are secured by a first mortgage on the new double track belt line railroad which has been built to give the Lake Shore & Michigan Southern two additional tracks for its main line through the city of Cleveland. The cost of this property was \$13,201,531. The road intersects every railroad entering Cleveland and was built with a maximum 0.3 per cent. grade, with no grade crossings.

LEHIGH VALLEY.—See editorial comments on the annual report in another column.

NATIONAL RAILWAYS OF MEXICO.—The interest payments, aggregating \$1,500,000, on the general mortgage 4 per cent. guaranteed bonds and on the first consolidated mortgage 4 per cent. bonds are, it is understood, to be paid when due, October 1, the Mexican government having agreed to extend any help necessary to the company.

NEW YORK CENTRAL & HUDSON RIVER.—The United States Senate has ordered the Interstate Commerce Commission to make a formal investigation of the New York Central's proposal to consolidate the Lake Shore & Michigan Southern with the lines east of Buffalo, and to make a new refunding mortgage. See editorial comments in our issue of July 11, page 41.

J. P. Morgan & Co., New York, have bought from the company and sold to the public \$5,000,000 5 per cent. one-year notes, the selling price to the public being 5 $\frac{1}{2}$ per cent.

ST. LOUIS & SAN FRANCISCO.—The receivers have asked Judge Sanborn for authorization to pay about \$3,316,000 principal and interest on certain issues of bonds and notes now due. The date for the hearing has not as yet been fixed.

ST. LOUIS SOUTHWESTERN.—A quarterly dividend of 1 per cent. has been declared on the non-cumulative preferred stock, payable October 15. This reduces the annual rate paid in 1912 and the first three-quarters of 1913 from 5 per cent. to 4 per cent.

SOUTHERN PACIFIC.—This company has made arrangements for the sale of \$7,130,000 $4\frac{1}{2}$ per cent. equipment trust certificates subject to the authorization of the California railroad commission.

SMYRNA-DARDANELLES RAILROAD.—The council of state of the Ottoman Empire has approved the concession to a French syndicate, L'Omnium d'Entreprises de Paris, for the construction and operation of a railroad from Smyrna to the Dardanelles with a branch line from Ezine to Kara-Bigha. The principal and most significant terms of the concession are as follows: The line is to be narrow gage and its total length approximately 310 miles. The main line between the Dardanelles and Smyrna will follow the coast line passing through or near Aivadjik, Adramit, Burhanic, Aivali, Dikili, and Ali Agha. The branch line between Ezine and Kara-Bigha will include the towns of Bairamitch, Djare-Payar, and Baighnilar. The concession has been granted for a period of ninety-nine years.

ANNUAL REPORTS.

BROOKLYN RAPID TRANSIT CO.—REPORT OF THE BOARD OF DIRECTORS TO THE STOCKHOLDERS FOR YEAR ENDING JUNE 30, 1913.

85 CLINTON STREET,
BROOKLYN, N. Y., August 5, 1913.

The financial results of the system for the year ending June 30, 1913, show:

An increase in gross earnings from operation of \$925,737.57, or 3.99 per cent.;
An increase in operating expenses of \$221,396.56, or 1.76 per cent.;
An increase in surplus from operation of \$785,705.40, or 21.17 per cent.;
An increase in reserves for insurance and depreciation of \$298,758.87;
A decrease in bills payable of \$1,400,000.
The net surplus of the system for the year was \$4,504,411.56.
Dividends declared during the year aggregated \$2,440,770.35. The rate was 1¼ per cent. quarterly, except for the last quarter, when it was increased to 1½ per cent.

Certain adjustments of the profit and loss account, including the setting aside of a special reserve of \$50,000 and the charging off of \$60,522.83 to supercession and depreciation, left the surplus of the combined system as of June 30, 1913, \$7,904,606.63, as against \$5,863,812.80 at the close of the fiscal year 1912.

The attention of stockholders is called elsewhere in this report to the gradual conversion into capital stock of the Brooklyn Rapid Transit Company's Refunding Mortgage Four Per Cent. Gold Bonds, thus increasing the amount of capital stock outstanding, which on June 30, 1913, was \$49,078,000. The opportunity for conversion expires on July 1, 1914.

COMPARATIVE STATEMENT OF THE RESULTS OF THE OPERATIONS OF THE BROOKLYN RAPID TRANSIT SYSTEM FOR YEARS ENDING JUNE 30, 1913, AND 1912.

	1913.	1912.	Increase or Decrease.
Gross Earnings from Operation.....	\$24,152,288.09	23,226,550.52	+ 925,737.57
Operating Expenses	12,833,455.89	12,612,059.33	+ 221,396.56
Net Earnings from Operation	11,318,832.20	10,614,491.19	+ 704,341.01
Income from Other Sources.....	339,946.88	317,991.12	+ 21,955.76
Total Income	11,658,779.08	10,932,482.31	+ 726,296.77
Less Taxes and Fixed Charges	7,161,851.41	7,221,260.04	— 59,408.63
Net Income	4,496,927.67	3,711,222.27	+ 785,705.40
Profit from Real Estate disposed of (a) and other Miscellaneous Items (b).....	**7,483.89	20,036.75	— 12,552.86
Total Surplus for Year....	4,504,411.56	3,731,259.02	+ 773,152.54
Surplus at Beginning of Year	5,863,812.80	5,427,394.54	+ 436,418.26
Total	10,368,224.36	9,158,653.56	+1,209,570.80
Of this amount there has been appropriated:			
Accounts written off.....	28,513.60	2,972.91	+ 25,540.69
Adjustment of Taxes prior years	*116,255.73	28,543.65	— 144,799.38
Adjustment of Expenses prior years	66.68	14,460.60	— 14,393.92
Supercession and Depreciation	60,522.83	9,012.95	+ 51,509.88
Special Reserve	50,000.00	1,000,000.00	— 950,000.00
Dividend on B. R. T. Co.'s Stock outstanding	2,440,770.35	2,239,850.65	+ 200,919.70
Total Appropriations	2,463,617.73	3,294,840.76	— 831,223.03
Balance Sheet Surplus	\$7,904,606.63	\$5,863,812.80	+2,040,793.83

*Credit. **1913 (b) only.

RAPID TRANSIT EXPANSION—AGREEMENTS WITH THE CITY.

During the Company's fiscal year the long negotiations with the City for the expansion of rapid transit (referred to in the last two preceding reports) were finally consummated in the contracts of March 19, 1913, between The City of New York and New York Municipal Railway Corporation, which was incorporated on September 27, 1912, for the purpose of carrying out this Company's part in the so-called Dual System.

These contracts were four in number, and covered substantially the following obligations:

1. The City agreed to construct at its expense three rapid transit railroads, namely:

(a) The Broadway-Fourth Avenue Line, comprising generally in Manhattan the Broadway-59th Street line, the Canal Street connection with Manhattan Bridge, the Centre Street Loop with its extension through Nassau and Broad Streets, and a tunnel under the East River, and in Brooklyn the Fourth Avenue subway from Manhattan Bridge to 86th Street, with branches to Coney Island via 38th Street and New Utrecht Avenue, and to a connection with the Brighton Beach railroad at Malbone Street via Flatbush Avenue.

(b) The Culver Line, constituting in effect another branch of the Fourth Avenue subway to Coney Island via Gravesend Avenue.

(c) The Fourteenth Street-Eastern Line, beginning at 6th Avenue, Manhattan, and extending under 14th Street and the East River to North Seventh Street, Brooklyn, and thence to a connection with the elevated railroads at East New York.

2. The Company agreed to equip the above named railroads, and to contribute towards the cost of construction thereof the sum of \$13,500,000 in addition to the cost of a connection between the Broadway and Canal

Street subways; also at its own expense to construct and equip certain elevated railroad extensions, one to Jamaica via Jamaica Avenue, and the other to Lefferts Avenue, Queens, via Liberty Avenue, and certain additional tracks upon the present elevated railroad system, and to provide for certain connections and reconstruction of the railroads and equipment of the New York Consolidated Railroad Co.

The estimated cost of construction to the City is \$100,500,000; of construction and equipment to the Company, \$65,000,000, besides the contribution of existing rapid transit railroads.

3. The lines to be constructed by the City are to be leased to the Company for a period of 49 years from January 1, 1917 (with provision for recapture by the City after ten years), and are to be operated by the Lessee in connection with the existing railroads of the New York Consolidated Railroad Co. (as enlarged and extended) as one system, and for a single fare.

There will be approximately 293 miles of track in the enlarged system (including trackage rights over the Astoria and Corona, Queens, lines enjoyed mutually with the Interborough Rapid Transit Co.), of which approximately 133 miles will be owned by the City.

Under the terms of the lease the annual net revenue remaining after operating expenses, taxes and provision for depreciation, is to be applied in the following order:

1. To the Lessee \$3,500,000 as representing the net earnings of the existing railroads which are to form part of the new rapid transit system. Out of this reservation the Lessee is to pay interest charges on capital investments prior to March 19, 1913, in the existing railroads.

2. To the Lessee six per cent. on its new investment in construction and equipment prior to the beginning of permanent operation, and thereafter interest and one per cent. sinking fund.

3. To the City interest and one per cent. sinking fund on its investment in cost of construction.

Any surplus remaining, after making provision for a moderate contingent reserve fund, is to be divided equally between the Lessee and the City.

Prior to the execution of the contracts with the City, and pursuant to the predetermined arrangement, the companies owning the existing railroads which are to form part of the new rapid transit system, namely, the Brooklyn Union Elevated Railroad Co., the Canarsie Railroad Co. and the Sea Beach Railway Co., were duly consolidated into the New York Consolidated Railroad Co., and subsequently the latter company took from the New York Municipal Railway Corporation an assignment of the operating provisions of the City contracts assumed by that corporation, so that the New York Consolidated Railroad Co. will be the operator of the new system. It also has acquired all the capital stock of the New York Municipal Railway Corporation, with the right and obligation to take any which may hereafter be issued, and has guaranteed the principal and interest of the latter company's funded debt. The money necessary for construction and equipment, however, will be provided by the New York Municipal Railway Corporation, and for this purpose it has mortgaged its agreement and lease with the City and all its other property, now or hereafter acquired, to secure \$100,000,000 of its Five Per Cent. Gold Bonds. Its authorized capital stock is \$2,000,000, of which \$100,000 has been issued and is outstanding.

Thus it will be seen that all the surplus earnings of the new rapid transit system, except that portion which is paid over to the City, will accrue to the New York Consolidated Railroad Co., of whose stock the Brooklyn Rapid Transit Co. and one of its constituent companies own over 96 per cent.

In order that funds necessary for carrying out the contracts with the City might be promptly available and because of the parent company's superior credit, the Brooklyn Rapid Transit Co., as set forth in last year's annual report, prior to the formation of the new company and to the execution of the City contracts, arranged with the Central Trust Co. of New York, Messrs. Kuhn, Loeb & Co., and Messrs. Kidder, Peabody & Co. for the sale of \$40,000,000 of its Six-year Secured Gold Notes on a Six Per Cent. basis, less a commission of one per cent. These notes were delivered on October 1, 1912. They date from July 1, 1912, bear interest at the rate of five per cent. per annum, and are secured by \$10,000,000 Refunding Mortgage Four Per Cent. Bonds of Brooklyn Rapid Transit Co. and \$40,000,000 of New York Municipal Railway Corporation's First Mortgage Five Per Cent. Gold Bonds, the latter bonds having been acquired at 97 and accrued interest with the proceeds of the notes, and with additional funds provided by the Brooklyn Rapid Transit Co. The notes are convertible, at the option of the holder, par for par, prior to January 1, 1916, into the New York Municipal Railway Corporation's bonds, which, in addition to the guarantee of New York Consolidated Railroad Co. previously referred to, bear the Brooklyn Rapid Transit Co.'s assumption of payment—principal and interest.

Stockholders are to be congratulated, therefore, that so large a part of the funds called for by the City contracts, and all that will probably be required during the first three years, are in hand and were secured upon more favorable terms than would be possible under existing financial conditions. The construction work is now under way and will be prosecuted as rapidly as conditions permit.

In the meanwhile, a portion of the Broadway-Fourth Avenue Line, namely, two tracks in the Centre Street Loop, was placed in operation on August 4, 1913, and, under the provisions of the City contract as to temporary operation, the pooling of earnings then became effective and the distribution of revenue will be made substantially as described above.

The status of the surface railroad lines in the Company's system remains unaffected by the new contracts with the City.

ADDITIONS, IMPROVEMENTS AND MAINTENANCE.

The maintenance of way and structure and of equipment during the year absorbed \$3,880,331.71 of the system's revenue, an increase in charges over the preceding year of \$88,485.21.

The construction charges aggregated \$5,400,819.67, of which the larger amount, as shown in the table elsewhere presented, was in connection with the rapid transit contracts entered into with The City of New York on March 19, 1913.

SURFACE LINES.

Two short extensions of surface lines were constructed during the year, namely, on Malbone Street from a connection with the Kingston Avenue line to a connection with the Nostrand Avenue line, and on Sixteenth Avenue from 58th Street to the Sea Beach line near 63rd Street. Additional trackage thus constructed was 1.19 miles measured as single track.

13.43 miles (including .14 miles on the Brooklyn Bridge) of single track were relaid with a standard type of heavy grooved rail.

122,565 square yards of improved pavement (14.57 miles of street) were

laid between tracks and rails, and in addition the city was reimbursed for approximately 32,150 square yards of pavement laid adjacent to the outer rails of tracks. A much larger volume of work has been arranged for the ensuing fiscal year.

Six electrically operated switches, three side tracks, and five cross-overs were constructed during the year, and seventy-five pieces of special work were renewed.

Portions of the trestle on the Flushing line across Flushing Creek were rebuilt and defective piles renewed on the bridge across Coney Island Creek on the Culver line.

The Church Avenue Tunnel under Ocean Parkway was reconstructed and widened and iron bar overhead work substituted for trolley wire.

ELEVATED LINES.

47,045 feet of rail (representing approximately 4.45 miles of single track) and 3,540 feet of steel guard rail were renewed.

19,300 cross ties, 28,582 feet of timber guard rail, 69,424 feet of foot-walk, and 2,473 track-bonds were renewed.

Three and one-half miles of elevated structure were repainted. This included sections of the Fifth Avenue line from 34th Street to 67th Street, Flatbush Avenue from Fulton Street to Fifth Avenue, Fulton Street from Fulton Ferry to Hudson Avenue, and Myrtle Avenue from Hudson Avenue to Grand Avenue.

The steel work of sixteen highway bridges across the Brighton Beach line was cleaned and repainted.

Waiting rooms were constructed at the Ocean Parkway station of the Brighton Beach line and at Van Sielen station of the Culver line.

Additional platform facilities were constructed at the Consumers' Park Station of the Brighton Beach line and entrances to Washington Avenue provided for the better accommodation of traffic due to the opening of the new ball grounds.

POWER STATIONS.

The 20,000 K. W. Turbo Generator Unit contracted for last year has been delivered and is now being erected, the installation of the auxiliary apparatus being practically completed.

A temporary sub-station, made necessary by the operation of the Centre Street Loop, has been erected at Centre and Walker Streets, Manhattan, and equipped with two 1,000 K. W. Rotary Converters and the necessary auxiliary apparatus.

TRANSMISSION SYSTEM.

66.77 miles of trolley wire were renewed and 2.06 miles erected in connection with extensions, side tracks, etc.

1,523 trolley poles were painted, 191 poles reinforced, 690 poles reset, 250 poles replaced, and 112 new poles erected.

1.56 miles of feeder were installed in underground conduits and 3.75 miles of overhead feeders removed.

CAR EQUIPMENT.

100 surface cars of the center entrance type were ordered and 11 had been placed in service at the close of the fiscal year.

105 cars of miscellaneous type—freight, mail, work cars, etc.—were equipped with wheel guards.

2 snow plows were added.

57 pairs of modern design Maximum Traction Trucks replaced an equal number of equipments of less efficient type.

1,507 surface passenger cars and 82 freight cars were overhauled, repaired and varnished.

900 elevated passenger cars were overhauled, repainted and varnished, and five additional lights installed in each of 32 motor cars.

The brake equipment of 317 elevated motor cars was improved by the installation of interlocking devices.

Additional machinery was installed in the various shops.

MISCELLANEOUS.

The construction of the Classon Avenue Relief Sewer by the City will involve temporary abandonment of tracks and re-routing of cars on certain lines, causing some inconvenience to patrons of such lines during the ensuing year and a very large expense to the companies.

The East New York Employees' Club House was altered to provide increased facilities and equipped with refrigerating plant and cold storage room, and additional restaurant and kitchen utensils and restaurant and club room facilities have been installed and improved at other locations.

The sprinkler equipment in the 58th Street Depot contracted for last year was completed.

Numerous minor improvements have been made, particularly in repair shops and depots, for the better protection of companies' properties against damage by fire.

300 new fire-proof metal lockers have been installed at various depots and shops.

New equipment for the construction and repair of tracks has been purchased, consisting of three rail grinders, two electric cranes, one electric rail welding machine, one electric bonding apparatus, two electric track drills, two gasoline concrete mixers, and one rail cutting machine.

MEDICAL INSPECTION BUREAU.

In December, 1912, the Medical Inspection Bureau was organized, in charge of a Chief Inspecting Physician and Assistant, for the examination and care of employees of the Transportation Department. The effectiveness of the work was reflected in a very material decrease in the number of working days lost by employees on account of sickness compared with the corresponding period of the year previous. The Bureau is supported by the company and the service is rendered without charge to employees, and through an arrangement with various druggists the employees are enabled to procure medicines at small cost.

INCREASE IN WAGES.

Just prior to the close of the fiscal year and effective July 4, 1913, a general increase was announced in wages of employees, benefitting about six thousand men in the Transportation Department. The increases varied according to the length of service and record of efficiency, and ranged from four to fifteen per cent.

ACQUISITION OF THE CONEY ISLAND & BROOKLYN R. R. CO.

An opportunity was presented during the fiscal year to acquire upwards of two-thirds of the capital stock of the Coney Island & Brooklyn Railroad Company, and application to take this stock was made on March 29, 1913, to the Public Service Commission for the First District by the Coney Island

& Gravesend Railway Company, one of the constituent companies of the Brooklyn Rapid Transit Company. No action has as yet been taken by the Commission upon the application.

SAFETY CAMPAIGN.

On March 1, 1913, the Brooklyn Rapid Transit Co., in co-operation with the American Museum of Safety, undertook a Children's Safety Campaign of six months in the public schools of Brooklyn. This work, authorized by the Board of Education of the City, has been continued with great success through the last four months of the regular sessions of the schools ending in June, and is now going on in the summer schools and playgrounds throughout the territory in which the company operates.

The safety crusade is conducted in the public schools by means of lectures delivered to the children in the class rooms and assembly halls, these lectures being illustrated by small models of B. R. T. trolley cars and supplemented by story pamphlets and the distribution of safety buttons. Three such pamphlets have been used in the regular sessions of the schools. The school lectures have also been conducted in many of the parochial institutions of Brooklyn, where the same model cars and pamphlets have been employed in impressing upon the children the safety lessons.

In many of the schools, the teachers have given most encouraging co-operation by such undertakings as the organization of safety patrols to guard the children in crossing streets going to and from school, and in the arrangement of safety days, on which, in several instances, an entire day has been given up to safety demonstrations, with lectures, recitations by the children, and safety plays in which some children would impersonate passengers, some conductors and motormen, and others pedestrians and the drivers of vehicles in the streets. In one school, where a publication is issued monthly, one number of this publication was devoted especially to the safety work, and cuts were printed of the B. R. T. safety wagon, the modern cars, and other paraphernalia of the safety crusade.

The safety work has adapted itself very successfully to the instruction in the summer schools and summer playgrounds maintained in various parts of the Borough of Brooklyn, particularly in the congested districts. The summer school and playground instruction being necessarily of a more informal character than that of the regular school session, the lecturers in the safety campaign have been able to come very intimately into contact with the children and in many instances, with their parents.

Specially for this summer school work, a set of drawings was prepared graphically illustrating accident conditions due to carelessness of passengers or pedestrians, which drawings have been employed with evident appreciation by the children and the teachers. All told, in the campaign of the last six months, approximately 300,000 safety buttons have been distributed, and 600,000 leaflets. The lecturers have visited practically all of the public schools in Brooklyn, 170 in number, and many parochial schools. The summer instruction is covering 13 summer schools and over 30 playgrounds.

It is anticipated that the school crusade this year will be a beginning for even more extended safety instruction in the schools with possible outside co-operation from organizations or committees. Evidences of appreciation by the children and their parents have come in from many sources, and the work has the cordial endorsement of the school authorities of the city.

Respectfully submitted,

T. S. WILLIAMS,
President.

COMPARATIVE SUMMARY OF OPERATIONS

FOR YEARS ENDING JUNE 30, 1913, AND 1912.

REVENUE FROM OPERATION	1913.	1912.	Inc. + or Dec. —	Per Cent.
Transportation	\$23,865,260.22	22,940,021.32	+916,238.90	3.99
Miscellaneous	287,027.87	277,529.20	+ 9,498.67	3.42
Total	\$24,152,288.09	23,226,550.52	+925,737.57	3.99
OPERATING EXPENSES				
Maintenance of Way and Structure	\$1,678,124.06	1,636,712.56	+ 41,411.50	2.53
Maintenance of Equipment	2,202,207.65	2,155,133.94	+ 47,073.71	2.18
Operation of Power Plant	1,421,122.81	1,404,160.19	+ 16,962.62	1.21
Operation of Cars—Trainmen's Wages	4,062,795.93	3,863,699.74	+199,096.19	5.15
Operation of Cars—Other Expenses	1,572,661.48	1,586,973.72	— 14,312.24	.90
Damages	605,091.77	681,440.81	— 76,349.04	11.20
Legal Expenses in Connection with Damages	217,211.43	231,975.02	— 14,763.59	6.36
General Law Expenses	61,933.58	65,195.52	— 3,261.94	5.00
Other General Expenses	746,870.84	733,394.19	+ 13,576.65	1.85
Freight and Mail Expenses	264,324.49	252,762.54	+ 11,561.95	4.57
American Railway Traffic Co.—Expenses	1,111.85	711.10	+ 400.75	56.40
Total	\$12,833,455.89	12,612,059.33	+221,396.56	1.76
NET REVENUE FROM OPERATION	\$11,318,832.20	10,614,491.19	+704,341.01	6.64
INCOME FROM OTHER SOURCES				
.....	339,946.88	317,991.12	+ 21,955.76	6.90
TOTAL INCOME	\$11,658,779.08	10,932,482.31	+726,296.77	6.64
DEDUCTIONS				
Taxes	\$1,750,083.07	1,775,041.42	— 24,958.35	1.41
Interest and Rentals (Net)	5,411,768.34	5,446,218.62	— 34,450.28	.63
Total	\$7,161,851.41	7,221,260.04	— 59,408.68	.82
SURPLUS	\$4,496,927.67	\$3,711,222.27	+785,705.40	21.17

COMPARATIVE CONSOLIDATED BALANCE SHEET.

ASSETS—JUNE 30, 1913.

COST OF ROAD AND EQUIPMENT:

Properties owned in whole or in part by Brooklyn Rapid Transit Company.....	\$126,544,983.30
Construction Expenditures, Constituent Companies, not yet funded.....	927,668.86
	\$127,472,652.16
Bonds of Brooklyn City Railroad Company Deposited with Trustee of Brooklyn Rapid Transit Company Refunding 4% Bonds	600,000.00
Advances to Leased Companies, account of Additions and Betterments to Leased Lines	11,440,521.27
Securities deposited with Trustee to guarantee performance of terms of Lease of Brooklyn City Railroad	4,153,945.00
(Comprising \$2,000,000 Brooklyn, Queens Co. & Suburban Railroad Co. 1st Mortgage 5% Bonds at 103½, \$25,000 Brooklyn Rapid Transit 5% Bonds at par, \$1,627,000 Brooklyn City Railroad Consolidated 5's at 103½, \$125,000 Brooklyn City Railroad Refunding 4's at par, and \$250,000 B. R. T. Co. 1st Refg. 4% Bonds at par.)	
Capital Expenditures account of Subway and Rapid Transit Lines	4,267,379.39
	\$147,934,497.82
MATERIALS AND SUPPLIES.....	1,079,872.49
CURRENT ASSETS:	
Accounts Receivable	\$881,150.79
Investments	165,166.08
Cash on Hand and in Bank.....	2,118,304.55
	3,164,621.42
In addition there are the following Treasury Bonds and Stocks available for sale not included in Assets or Liabilities:	
Brooklyn Rapid Transit Company, Capital Stock, par value	\$64,782.02
Bonds of Brooklyn Rapid Transit and Constituent Companies, par value.....	57,111,500.00
CASH FUND FOR CONSTRUCTION AND EQUIPMENT OF SUBWAYS AND RAPID TRANSIT LINES.....	35,483,220.19
SPECIAL DEPOSITS OF SECURITIES AND CASH:	
Insurance Reserve Investments.....	\$420,690.43
City of New York	1,000,000.00
	1,420,690.43
PREPAID ACCOUNTS	194,910.81
	\$189,277,813.16

LIABILITIES—JUNE 30, 1913.

CAPITAL STOCK:

Brooklyn Rapid Transit Company—	
Capital Stock	\$49,078,000.00
Less—In Treasury.....	64,782.02
	\$49,013,217.98
Constituent Companies—	
Shares not owned by the Brooklyn Rapid Transit System.....	824,008.98
	\$49,837,226.96
FUNDED DEBT:	
Issued—	
Brooklyn Rapid Transit Company.....	53,885,000.00
The Brooklyn Heights R. R. Co.....	250,000.00
The Nassau Electric Railroad Co.....	15,000,040.00
Brooklyn, Queens Co. and Suburban R. R. Co.	6,624,000.00
New York Consolidated R. R. Co.....	23,650,000.00
Brooklyn Union Elevated R. R. Co.....	
Sea Beach Railway Company.....	
B. R. T. Co.'s 6 Year 5% Secured Gold Notes	40,000,000.00
New York Municipal Railway Corporation—5% Bonds	40,000,000.00
	\$179,409,040.00
Less in Treasury or pledged as collateral.....“C”	\$57,111,500.00
Deposited with Trustees of Mortgages ....“D”	1,863,000.00
	58,974,500.00
REAL ESTATE MORTGAGES.....	120,434,540.00
	448,500.00
CURRENT LIABILITIES:	
Bills Payable (secured by deposit of Brooklyn Rapid Transit Company Refunding Bonds)	2,750,000.00
Accounts Payable (including interest and rentals vouchered, and Dividend payable July 1, 1913).....	3,302,989.95
Taxes Accrued	1,636,882.18
Interest Accrued on Funded Debt.....	615,383.35
Interest and Rentals Accrued.....	32,879.29
	8,338,134.77
RESERVES:	
Insurance Reserve	472,118.70
Accrued Amortization of Capital and Sinking Fund Accrual	884,719.44
Special Reserve	957,966.66
	2,314,804.80
SURPLUS	7,904,606.63
	\$189,277,813.16

LEHIGH VALLEY RAILROAD COMPANY—FIFTY-NINTH ANNUAL REPORT.

PHILADELPHIA, August 6, 1913.

To the Stockholders of the

LEHIGH VALLEY RAILROAD COMPANY.

The Board of Directors herewith submit the annual report of the business and condition of your Company for the fiscal year ended June 30, 1913.

MILEAGE.

The first track mileage owned or controlled and operated by the Lehigh Valley Railroad Company, the main line of which is double track, extending from Jersey City, N. J., to Buffalo and Suspension Bridge, N. Y., is as follows:

	MILES
Lehigh Valley Railroad Company.....	317.16
Controlled by ownership of entire capital stock.....	934.87
Controlled by ownership of majority of capital stock and lease.....	115.37
Operated under lease	27.73
Total mileage operated (owned or controlled).....	1,395.13
Trackage rights over railroads owned by other companies.....	43.77

Total first track mileage

In addition to the above there are 596.05 miles, or 41.42 per cent., of second track, 92.34 miles of third track, 44.84 miles of fourth track and 1,182.70 miles of yard tracks and sidings, a total of 3,354.83 miles of track in operation at the close of the year. A detailed statement of track mileage is shown on pages 47 to 49. The average number of miles of railway operated for the year was 1,450.97, upon which the mileage statistics in certain tables submitted in this report are based.

Several changes have been made in the mileage heretofore shown under trackage rights on lines of other companies, the principal items being the elimination of first and second track mileage between West Newark Junction, N. J., and Jersey City, N. J., by reason of the cancellation of the agreement with the Pennsylvania Railroad Company for the running of passenger trains into their Jersey City terminal, the omission of certain mileage over the Niagara Falls Branch of the New York Central and Hudson River Railroad Company at North Tonawanda, N. Y., and the omission of mileage on lines of the Pennsylvania Railroad Company between Schuylkill Haven Junction, Pa., and Pottsville, Pa., and between New Boston Junction, Pa., and Pottsville, Pa., over which this Company has ceased running its trains. These deductions are partially offset by the acquisition of trackage rights over the lines of the Central Railroad Company of New Jersey between Oak Island Junction, N. J., and Jersey City, N. J., and in connection with other changes of minor importance, show a net decrease of 15.04 miles of total first track miles operated, and a decrease of 9.84 miles of second track. The increases of 19.07 miles of third track and 7.26 miles of fourth track are due to the extension of the third and fourth track system.

OPERATING REVENUES AND EXPENSES.

The following statement sets forth the gross revenues and expenses and net revenue from operation for the fiscal year, not including outside operations and other income, compared with similar figures for the fiscal year 1912. The complete income account appears on page 24.

GROSS OPERATING REVENUES.

From	1913.	1912.	Increase.
Coal freight	\$20,385,389.09	\$16,301,316.24	\$4,084,072.85
Merchandise freight	16,339,748.97	14,591,239.56	1,748,509.41
Passenger	4,867,554.03	4,703,733.52	163,820.51
Mail	191,821.11	191,703.74	117.37
Express	506,191.11	471,957.22	34,233.89
Other transportation	415,731.71	379,919.42	35,812.29
Miscellaneous	336,935.87	266,065.51	70,870.36
Total operating revenues.....	\$43,043,371.89	\$36,905,935.21	\$6,137,436.68
OPERATING EXPENSES.			
	1913.	1912.	Increase.
Maintenance of way and structures	\$5,694,422.24	\$3,963,589.12	\$1,730,833.12
Maintenance of equipment.....	7,561,270.87	6,313,316.76	1,247,954.11
Traffic expenses	982,857.66	980,116.82	2,740.84
Transportation expenses	13,993,617.35	12,606,961.58	1,386,655.77
General expenses	875,651.45	856,265.53	19,385.92
Total operating expenses.....	\$29,107,819.57	\$24,720,249.81	\$4,387,569.76
NET OPERATING REVENUE.....	\$13,935,552.32	\$12,185,685.40	\$1,749,866.92

Ratio of operating expenses to operating revenues

OPERATING REVENUES.

Coal Freight.

The transportation of coal and coke produced a revenue of \$20,385,389.09, an increase of \$4,084,072.85, or 25.05 per cent., as compared with the preceding twelve months.

The percentage of coal freight revenue to total operating revenues was 47.36 per cent., an increase of 3.19 per cent.

The coal and coke transported, excluding the Company's supply coal, was 17,895,407 tons, an increase of 2,728,554 tons, or 17.99 per cent.

This class of tonnage was 55.29 per cent. of the total tonnage hauled during the year, an increase of 1.15 per cent.

Merchandise Freight.

The revenue received from the transportation of merchandise freight was \$16,339,748.97, an increase of \$1,748,509.41, or 11.98 per cent., as compared with the preceding year.

The percentage of revenue derived from the transportation of merchandise freight was 37.96 per cent. of the total operating revenues, a decrease of 1.58 per cent.

The tonnage moved, excluding Company's material, was 14,472,389 tons, an increase of 12.66 per cent.

General Freight.

The total revenue from both coal and merchandise freight was \$36,725,138.06, an increase of \$5,832,582.26, or 18.88 per cent., as compared with the preceding twelve months.

The entire freight traffic amounted to 32,367,796 tons, an increase of 4,354,496 tons, or 15.54 per cent.

The number of tons carried one mile was 5,812,384,917, an increase of 1,027,307,531 ton miles, or 21.47 per cent.

The average haul was 179.57 miles, an increase of 8.76 miles, or 5.13 per cent.

The average revenue per ton was 113.46 cents, as compared with 110.28 cents last year, an increase of 3.18 cents, or 2.88 per cent.

Company's freight, not included in the above, amounted to 3,322,041 tons, an increase of 377,662 tons, or 12.83 per cent.

The total freight train mileage was 9,703,311 miles, an increase of 1,250,333 miles, or 14.79 per cent.

The revenue received per freight train mile was \$3.78, an increase of \$0.13, or 3.56 per cent.

The average trainload of revenue freight was 599.01 tons, an increase of 32.93 tons, or 5.82 per cent. Including Company's freight, the average trainload was 620.71 tons, an increase of 33.20 tons, or 5.65 per cent.

Passenger.

The earnings from passenger traffic amounted to \$4,867,554.03, an increase of \$163,820.51, or 3.48 per cent., over the preceding year.

The total number of passengers carried was 5,518,524, an increase of 168,676, or 3.15 per cent.

The number of passengers carried one mile increased 6,695,049, or 2.53 per cent.

The average revenue per passenger was 88.20 cents, an increase of .28 cent, or .32 per cent.

The average revenue per passenger per mile was 1.792 cents, an increase of .017 cent, or .96 per cent.

The average distance traveled by each passenger was 49.23 miles, a decrease of .30 mile, or .61 per cent.

Passenger train mileage was 4,491,013, a decrease of 32,407 miles, or .72 per cent., as compared with an increase in this revenue of 3.48 per cent.

The average revenue from passengers per passenger train mile was 108.38 cents, an increase of 4.39 cents, or 4.22 per cent.

Mail.

For the transportation of United States mails the Federal Government paid the sum of \$191,821.11, an increase of \$117.37.

Express.

The revenue from this class of business amounted to \$506,191.11, an increase of \$34,233.89.

Other Transportation.

The earnings derived from transportation other than shown under the preceding headings were \$415,731.71, an increase of \$35,812.29.

Miscellaneous.

Miscellaneous revenue amounted to \$336,935.87, an increase of \$70,870.36.

OPERATING EXPENSES.

Maintenance of Way.

The expenditures for the maintenance of way and structures amounted to \$5,694,422.24, an increase of \$1,730,833.12, or 43.67 per cent., as compared with the preceding year.

Seven steel bridges and one concrete-steel bridge were built in connection with additional track construction. Sixteen steel bridges and nine concrete-steel bridges were placed in the track, replacing light steel or wooden bridges, and twelve steel bridges were strengthened. Nineteen bridges were replaced by culverts and five small bridges were abandoned and the openings filled. Two new steel highway bridges with solid floors and one steel foot bridge were erected. Two wooden highway bridges were replaced by steel structures and one steel highway bridge was renewed. One wooden highway bridge was replaced by a culvert.

13,560 tons of 110-pound rail, 50,823 tons of 100-pound rail and 602 tons of 90-pound rail, together with necessary frogs, switches, etc., were placed in the track.

1,425,328 tie plates and 688,109 anti-rail creepers were used. 948,864 cross ties, 2,500,803 feet B. M. switch ties, 836,968 feet B. M. bridge ties and lumber amounting to 5,578,645 feet B. M. were used.

569,441 of the cross ties, 1,790,798 feet B. M. of switch ties and 778,038 feet B. M. of bridge ties were treated with creosote.

90,274 cubic yards of crushed stone were used in ballasting track. 46,004 feet of drain tile were placed in the roadbed.

6.33 miles of new telegraph and telephone pole line were erected, 52.72 miles rebuilt and 33.75 miles reset. 1,164.40 miles of copper and 99.85 miles of iron wire were used in extending and renewing the telephone, telegraph and signal wires on the system.

Maintenance of Equipment.

The sum of \$7,561,270.87 was expended for the maintenance of equipment, an increase of \$1,247,954.11, or 19.77 per cent., over the preceding twelve months. Included therein is a charge of \$1,144,007.97 for the depreciation of equipment, as called for in the accounting system prescribed by the Interstate Commerce Commission.

Forty-seven passenger coaches and five combined passenger and baggage cars were converted into workmen's cars, three postal and eleven combined baggage and mail cars into express cars, one dining car into a business car, and one hundred and ten produce cars into ice cars. Eleven passenger coaches, two combined passenger and baggage cars and thirteen box cars were transferred to caboose service and forty-five freight equipment cars to road service.

Sixty-seven worn-out locomotives, nine passenger coaches, four combined passenger and baggage cars, four combined baggage and mail cars, one fruit car, 901 freight equipment cars and 161 road service cars were condemned and either sold or destroyed during the year and their value written off the books by appropriate charges through operating expenses.

Eight hundred locomotives received heavy and general repairs.

481 passenger equipment cars received heavy repairs, 382 were painted and varnished, and 51 equipped with electric lighting apparatus. Steel underframes were applied to 2,962 wooden freight cars, making a total of 10,593 cars so equipped during the last five years. 22,476 freight equipment cars received heavy and general repairs.

The total number of locomotives on hand at the close of the year was 903, with a tractive power of 27,655,900 pounds. The total number of freight equipment cars was 43,818, with a capacity of 1,585,192.5 tons.

Traffic Expenses.

The expenditures under this heading amounted to \$982,857.66, an increase of \$2,740.84 as compared with the preceding twelve months.

Transportation Expenses.

The cost of conducting transportation was \$13,993,617.35, an increase of \$1,386,655.77, or 11.00 per cent., over the preceding year.

The ratio of transportation expenses to total operating revenues was 32.51 per cent., as compared with 34.16 per cent. last year, a decrease of 1.65 per cent.

General Expenses.

This class of expenses amounted to \$875,651.45, or 2.03 per cent. of the total operating revenues.

Taxes.

The taxes accrued on your property, capital and business during the year amounted to \$1,609,151.39, an increase of \$157,840.22 over the preceding year.

ADDITIONS AND BETTERMENTS.

During the year there was expended for the acquisition of new property and for the improvement and development of existing property the sum of \$6,507,721.40, which was charged to Additions and Betterments. A classification of these expenditures, as required by the Interstate Commerce Commission, appears on page 44. The more important expenditures are here specifically referred to:—

New equipment has been purchased and added to the property during the year as follows: Fifty-one freight locomotives, one passenger locomotive, fifteen switching locomotives, six locomotive tenders, three steel library buffet cars, one thousand steel underframe refrigerator cars, one caboose car, four locomotive cranes, eighty-eight steel underframe pneumatic dump cars, one scale test car and one derrick car.

Orders have also been placed for thirty-eight freight locomotives, five passenger locomotives, fifteen switching locomotives, seven locomotive tenders, one thousand steel underframe box cars and one thousand steel coal cars.

The third track was extended from Three Bridges to Stanton, a distance of 5.52 miles, from Stafford to North LeRoy, a distance of 4.87 miles, and a further extension from North LeRoy to Pittsburg and Lehigh Junction, a distance of 4.98 miles, is under construction. Third and fourth tracks were extended from South Somerville to Flagtown, a distance of 4.98 miles, and from Parkview to West Elizabeth, a distance of 1.03 miles. These extensions will greatly facilitate the movement of freight and avoid yard congestion.

95,779 feet, or 18.14 miles, of Company's sidings and 36,010 feet, or 6.82 miles, of industrial sidings were constructed during the year.

A westbound passing siding, 1.32 miles in length, was constructed at Scottsville.

Eight tracks, with a capacity of 248 cars, were added to the yard at Richards. Additional sidings of thirty-six and thirty-four cars capacity were laid at Catasauqua and Suspension Bridge, respectively. Tracks in Coxton Yard were remodelled and extended, increasing the capacity by twenty-nine cars. Additional tracks of two hundred cars capacity at Florence, referred to in the preceding report, were completed. Work is now under way at that point to provide room for the construction of a switching lead from the Florence Yard.

Additional freight delivery tracks with paved driveways were constructed at Irvington and at New Brunswick Avenue, Perth Amboy, and the driveways leading to the coal trestle at Bound Brook and the driveways at the team tracks at Pittston were paved. In order to conform to the grade established by the city of Jersey City, it was necessary to raise and repave the driveways and also raise the sidewalk and tracks at the Grand Street freight station, Jersey City.

A "Y" was constructed at Tannery to permit of turning the large Mikado engines and the curvature of the "Y" at Fairview is being reduced for the same purpose.

A change was made in the location of the connection from the main tracks to the coal shipping trestle and yard tracks at Canastota in order to eliminate the crossing at grade of six tracks of the New York Central and Hudson River Railroad.

Notice having been served by the Pennsylvania Railroad Company, effective May 1, 1913, terminating the contract giving this Company the right of trackage from Newark east, including the use of its passenger terminal facilities at Jersey City and Cortlandt and Desbrosses Streets, New York, arrangements were made with the Central Railroad Company of New Jersey for trackage east of Oak Island Junction and the use of its passenger terminals at Jersey City and New York. In connection with this change a brick passenger station was constructed at Newark, the tracks between Parkview and Oak Island Junction were rebuilt and ballasted with stone and a passenger terminal yard, including a steam heating system, air compressor plant and other necessary facilities, was constructed at Johnson Avenue, Jersey City.

An extension of the Seneca Falls Branch for a distance of 5.7 miles eastward to a connection with the New York Central and Hudson River Railroad was begun during the year and an agreement entered into with that company granting your Company trackage rights to Cayuga, a distance of 2.2 miles, where a connection is made with your line.

Substantial progress has been made in the development of the new passenger and freight terminals at Buffalo, located on Main and Washington Streets respectively. The work of clearing the site is under way and the proposed changes in viaducts and streets affected by this work have been approved by the city authorities. Plans for the station buildings are now under consideration with the Terminal Commission of Buffalo.

The reinforced concrete grain storage elevator at the National Docks Terminal, New York Harbor, referred to in the last annual report, is practically completed and will be in operation at an early date.

The coal unloading plant for the transshipment of coal from cars to vessels at Perth Amboy, mentioned in last year's report, is now in operation.

Heavy repairs were made to the coal shipping trestles at Tift Farm and North Fair Haven, and at the latter point a number of pockets were raised to permit the loading of larger boats. The ore dock at Tift Farm has been rebuilt for a distance of six hundred feet. Two additional large capacity steam cranes are being installed at that point for the handling of rails, ore and pig iron, which will enable more prompt despatch of vessels.

An ice-house of 10,000 tons capacity, with modern machinery for handling and crushing ice, was built at Sayre, and smaller ice-houses were constructed at Perth Amboy, Easton and Lehigh. The ice-houses at Clinton and West Portal and freight office and platform at Geneva freight station were enlarged.

A concrete and steel transfer platform of two hundred cars capacity is in course of construction at Manchester. By concentrating the work at that point the transfer platform at Dingen Street, Buffalo, where operations are conducted at a disadvantage, will be abandoned and the work at Sayre and other points will be reduced.

To replace a shed destroyed by fire several years ago, a single story freight shed of steel and corrugated iron construction was built on Pier "B," Jersey City.

Pier "C," Jersey City, was equipped with an automatic fire alarm system, and Pier 66, New York, with an automatic sprinkler system.

In order to expedite the handling of freight, fifty electrically operated freight trucks have been placed in service at the Lake Freight House, Buffalo. A steel and concrete garage was built and necessary charging apparatus installed.

Fifty-five gasoline motor cars were purchased for the use of section, bridge, signal and telegraph gangs, making a total of eighty-one of these motors now in service.

Two electric derricks of two tons capacity each were installed at the team tracks at Rochester and a twenty-ton transfer crane was erected at Cortland.

A coal conveyor was installed at the boiler house at Easton shops and pneumatic ash conveyors, for the handling of locomotive ashes direct to cars, were constructed at Mount Carmel, Weatherly and Wilkes-Barre.

A water station was installed at Flax Mill, together with a concrete lined reservoir having a capacity of 225,000 gallons and supplying two 12-inch water columns. A new gravity water supply has been completed at Hays Creek, concrete lined reservoirs of 40,000 gallons and 275,000 gallons capacity having been constructed and two 12-inch water columns erected. To replace worn-out wooden tanks, steel standpipes of 70,000 and 212,000 gallons capacity were erected at Lodi and East Buffalo, respectively. A 100,000-gallon steel tank was installed at Johnson Avenue, Jersey City. New 12-inch water columns were erected at Trenton, Manville and Hazleton.

A mechanical interlocking plant of twenty-eight levers was constructed at Tannery to operate the switches and signals governing the connection between the main line and the Hays Creek Branch. A similar plant of nineteen levers was installed at the west end of Oak Island Yard, controlling the connection of the yard tracks with the main line passenger tracks at that point. New mechanical interlocking plants were installed at Three Bridges, Richards and Treichlers, consisting of twenty, sixteen and twenty-four levers, respectively, to operate the switches and signals at the ends of the third and fourth track systems.

The disc automatic signals between South Somerville and Phillipsburg have been replaced with three-position upper-quadrant automatic signals. Three-position automatic signals were installed between Ackerman and Tannery on the Hays Creek Branch. Thirteen audible and visible crossing signals and one audible crossing signal were installed at highway crossings.

The entire main line of your road is now equipped with telephone train dispatching lines, the circuit between Manchester and Buffalo, referred to in last year's report, having been completed during the year. In addition, the branch line extending from Elmira to Camden was similarly equipped. One hundred and thirty-nine portable telephone sets were installed on passenger and freight trains.

Telegraph and telephone lines were rebuilt for a distance of 8.3 miles on the Mahanoy and Hazleton Division, 6.4 miles on the Wyoming Division, 20.8 miles on the Auburn Division and 16.37 miles on the Buffalo Division. Poles were re-set for a distance of twenty-one miles on the Wyoming Division and eleven miles on the Auburn Division.

FINANCIAL.

No additional capital obligations have been issued and sold by your Company during the year, the resources having been sufficient for all expenditures. In fact, the capital obligations have been reduced by the sum of \$2,015,000, as follows:

DESCRIPTION.	INTEREST RATE.	MATURITY.	AMOUNT.
Collateral Trust Bonds	4%	Feb. and Aug. . . .	\$1,000,000
Equipment Trust, Series I, Certificates	4%	September	400,000
Equipment Trust, Series J, Certificates	4½%	March and Sept. . .	500,000
Mortgages on Real Estate.....	5.4%	December	115,000
Total			\$2,015,000

The retirement of these obligations, all of which were outstanding excepting Equipment Trust, Series I, Certificates held in the treasury, reduces the fixed charges of the Company \$68,710 per annum.

An additional Equipment Trust, known as Series K, authorizing the issuance of \$1,500,000 Four Per Cent. Certificates, was created and is a lien upon one thousand steel underframe refrigerator cars, thirty steel passenger coaches and twenty steel smoking coaches. These certificates mature in semi-annual installments March 1st and September 1st each year, the last installment falling due September 1, 1917. \$150,000 matured March 1, 1913, and were retired. The remainder, \$1,350,000, have been placed in the treasury and are available for sale or other use as the necessity may arise.

The subsidiary companies owned by the Lehigh Valley Railroad Company, to which it made cash advances for expenditures to cover additions and betterments made during the past year to their respective properties, have reimbursed your Company by the issuance of Fifty-Year Five Per Cent. Gold Debentures, as follows:

Lehigh Valley Railroad Company of New Jersey.....	\$809,000
The Lehigh Valley Rail Way Company.....	717,000
National Storage Company	580,000
Pennsylvania and New York Canal and Railroad Company	253,000
Lehigh Valley Transportation Company.....	66,000
Loyalsock Railroad Company.....	3,000

These securities have been deposited with the Trustee of the General Consolidated Mortgage as required thereby.

Your Company has also received and placed in its treasury \$157,000 Wyoming Valley Water Supply Company First Mortgage Five Per Cent. Bonds in reimbursement of advances made to that Company for capital expenditures.

Additional advances were made to subsidiary real estate companies in the sum of \$151,499.44 to cover the purchase of land for the improvement and extension of terminal and other facilities.

It has been the policy of your Company, as opportunity afforded, to reduce the number of its subsidiary companies. During the year the Jersey City Belt Line Railway Company and the Newark Bay Railway Company were dissolved. Those companies were organized in 1890 for the purpose of constructing certain branches in the vicinity of the Jersey City Terminal. These branches have now been projected by the Lehigh Valley Railroad Company of New Jersey, which obviated the necessity of maintaining the two former corporations.

The book value of the capital stock of Coxe Brothers & Company, Incorporated, was reduced by the sum of \$1,000,000, Profit and Loss Account having been charged with \$980,362.28, the balance being charged to a small depreciation reserve, which was thereby extinguished. It has been the practice in each of the five preceding years to reduce the value of this property by a similar amount which fully offsets any depreciation.

Working Assets are \$32,277,506.91 in excess of Working Liabilities. Semi-annual dividends of five per cent. each were declared in December, 1912, and June, 1913, on the preferred and common capital stocks of the Company, payable respectively in January and July, 1913.

For comparative purposes, it has been necessary to re-state the Income Account, for the year 1912, appearing on page 24, owing to the fact that the Interstate Commerce Commission issued an order, effective July 1, 1912, requiring certain changes in the items "Taxes Accrued," "Other Income" and "Deductions from Income."

It will be observed that in the statement "Rentals of Leased Roads and Guaranties," appearing on page 29, the guaranteed dividends on the preferred and consolidated stocks of the Morris Canal and Banking Company are not shown for the year. This for the reason that, under the accounting

classification of the Interstate Commerce Commission, the same are included in the Income Account in the item "Miscellaneous Deductions." The rental which this Company has been paying for the use of certain tracks owned by the State Line and Sullivan Railroad Company and the Raritan Terminal and Transportation Company is this year included in the statement "Rentals of Leased Roads and Guaranties" in order to bring the same into harmony with the rules of the Interstate Commerce Commission.

The accounts of the Company for the year, including the cash and security balances, have been examined and verified by certified public accountants, their certificate as to the correctness of the same appearing on page 19.

GENERAL REMARKS.

It is gratifying to observe that the operating revenues of the Company show a healthy growth as compared with previous years. It should be borne in mind, however, that the considerable increase in earnings over those of the preceding year does not reflect a normal increase, since in that year the revenues were greatly reduced by reason of the suspension of mining in the anthracite coal fields for the months of April and May pending negotiations for a new wage agreement between the mining companies and their employees.

The increase in operating expenses is due to the higher rates of wages paid to labor in all branches of the Company's service, to the prevailing high price of materials and supplies, to liberal appropriations for the maintenance of roadway and equipment and as well to the added expense of handling an increased volume of traffic.

The attention of the Company's stockholders is particularly called to the tax accruals, which are every year showing a steady increase and now amount to 3.74 per cent. of the Company's gross operating revenues. In the last five years taxes have increased 43.31 per cent. whereas the gross operating revenues have increased but 21.21 per cent. A further serious burden, which is reflected in the cost of transportation, is the wages of the additional men that are now arbitrarily required on trains as a result of the legislative enactment of the so-called "Full Crew Bills," which have been passed in the States of New York, New Jersey and Pennsylvania.

The floating equipment of the Lehigh Valley Transportation Company, the capital stock of which is owned by your Company, has been fully maintained. One steel tug and two steam hoisting barges were purchased and received during the year. In addition to the foregoing, contracts have been made for two steam hoisting barges and ten covered barges, five of which will be equipped for heating and refrigerating. Thirteen wooden coal barges were converted into grain boats. One tug and eight barges, unfit for further service, were condemned and sold or otherwise disposed of. The floating equipment used by your Company and its affiliated companies is set forth in detail on page 46.

Notwithstanding the efforts of your Company, no relief has as yet been obtained from the Legislature of the State of New Jersey in respect to the operation of the Morris Canal. During the past session of that Legislature a bill was introduced which would have been acceptable to this Company if passed and which reconciled virtually all the interests concerned with the matter of abandoning the Canal. Unfortunately the Legislature adjourned without taking any action on the bill in question. However, the Morris Canal Abandonment Commission, appointed under a resolution passed by the Legislature at the preceding session, is expected to make a report next fall and there is a prospect of some satisfactory settlement of the matter being made within the next year.

The operation of the Lehigh and New York Railroad under the lease made in 1895 has resulted in a loss of \$130,710.41 for the year just closed. A suit, brought by certain of the preferred stockholders of that Company against the Lehigh Valley Railroad Company in respect of that operation and the method of accounting for the results thereof, is now pending.

There were located on the system during the year seventy-three new industries, of which sixty-three have direct track connections with the Company's lines.

The total payments direct to labor for the year amounted to \$17,639,627.77, or 54.88 per cent. of the total operating expenses, including outside operations, the same having been distributed among an average of 22,800 employees.

The sum of \$56,991.34 was contributed by the Company to its Employees' Relief Fund.

Mr. Fred M. Kirby, of Wilkes-Barre, Pennsylvania, was elected a director to fill the vacancy caused by the resignation of Mr. Alfred C. Harrison.

On behalf of the Board of Directors, the officers and employees are thanked for the efficient and faithful services rendered by them during the year.

E. B. THOMAS,
President.

COMPARATIVE INCOME ACCOUNT FOR THE YEARS ENDED JUNE 30, 1913, AND 1912.

	1913.	1912.	INCREASE OR DECREASE.
OPERATING REVENUES:—			
Coal freight revenue.....	\$20,385,389.09	\$16,301,316.24	\$4,084,072.85
Merchandise freight revenue.	16,339,748.97	14,591,239.56	1,748,509.41
Passenger revenue	4,867,554.03	4,703,733.52	163,820.51
Mail revenue	191,821.11	191,703.74	117.37
Express revenue	506,191.11	471,957.22	34,233.89
Other transportation revenue	415,731.71	379,919.42	35,812.29
Miscellaneous revenue	336,935.87	266,065.51	70,870.36
Total operating revenues.....	\$43,043,371.89	\$36,905,935.21	\$6,137,436.68
OPERATING EXPENSES:—			
Maintenance of way and structures	\$5,694,422.24	\$3,963,589.12	\$1,730,833.12
Maintenance of equipment... ..	7,561,270.87	6,313,316.76	1,247,954.11
Traffic expenses	982,857.66	980,116.82	2,740.84
Transportation expenses	13,993,617.35	12,606,961.58	1,386,655.77
General expenses	875,651.45	856,265.53	19,385.92
Total operating expenses.....	\$29,107,819.57	\$24,720,249.81	\$4,387,569.76
Ratio of operating expenses to operating revenues	67.62%	66.98%	.64%
Net operating revenue.....	\$13,935,552.32	\$12,185,685.40	\$1,749,866.92
OUTSIDE OPERATIONS, NET.....	*280,210.32	*291,239.44	11,029.12
TOTAL NET REVENUE.....	\$13,655,342.00	\$11,894,445.96	\$1,760,896.04
RAILWAY TAX ACCRUALS.....	1,447,205.04	1,312,011.62	135,193.42
OPERATING INCOME	\$12,208,136.96	\$10,582,434.34	\$1,625,702.62
OTHER INCOME:—			
Hire of equipment—Balance.	\$286,732.93	\$72,257.51	\$214,475.42
Joint facility rent income....	416,543.34	316,599.20	99,944.14
Dividend income	666,123.10	654,495.25	11,627.85

	1913.	1912.	INCREASE OR DECREASE.
Income from funded securities	382,314.16	461,579.45	—79,265.29
Miscellaneous income	552,041.07	611,529.97	—59,488.90
Total other income.....	\$2,303,754.60	\$2,116,461.38	\$187,293.22
TOTAL INCOME	\$14,511,891.56	\$12,698,895.72	\$1,812,995.84
DEDUCTIONS FROM INCOME:—			
Interest deductions for funded debt	\$3,127,360.15	\$3,167,635.15	—\$40,275.00
Deductions for lease of other roads	2,239,295.00	2,239,295.00	.....
Joint facility rent deductions	167,062.33	153,926.71	13,135.62
Miscellaneous tax accruals... ..	161,946.35	139,299.55	22,646.80
Miscellaneous deductions	54,399.51	185,719.22	—131,319.71
Total deductions from income	\$5,750,063.34	\$5,885,875.63	—\$135,812.29
NET INCOME	\$8,761,828.22	\$6,813,020.09	\$1,948,808.13

*Deficit.

PROFIT AND LOSS ACCOUNT FOR THE YEAR ENDED JUNE 30, 1913.

	Dr.	Cr.
Balance, July 1, 1912		\$23,444,703.46
Net income for year ended June 30, 1913....		8,761,828.22
Reduction of book value of capital stock of Coxe Bros. & Co., Inc.....	\$980,362.28	.....
Property abandoned	87,562.28	.....
Miscellaneous adjustments	11,575.70	.....
Dividends:		
Five per cent. on preferred stock, paid Jan. 11, 1913.....	\$5,315.00	.....
Five per cent. on common stock, paid Jan. 11, 1913.....	3,025,085.00	.....
Five per cent. on preferred stock, due July 12, 1913.....	5,315.00	.....
Five per cent. on common stock, due July 12, 1913.....	3,025,085.00	.....
Balance, June 30, 1913.....	6,060,800.00	25,066,231.42
	\$32,206,531.68	\$32,206,531.68

Balance brought forward, July 1, 1913..... \$25,066,231.42

GENERAL BALANCE SHEET, JUNE 30, 1913.

Dr.	ASSETS.	
ROAD AND EQUIPMENT:—		
Investment to June 30, 1907.....	\$54,365,714.13	.....
Investment since June 30, 1907.....	18,494,236.23	.....
	\$72,859,950.36	.....
Less reserve for accrued depreciation.....	6,010,546.64	.....
		\$66,849,403.72
SECURITIES:—		
Securities of proprietary, affiliated, and controlled companies—pledged	\$32,289,451.58	.....
Securities of proprietary, affiliated, and controlled companies—unpledged	3,981,432.83	.....
		36,270,884.41
OTHER INVESTMENTS:—		
Advances to proprietary, affiliated, and controlled companies for construction, equipment and betterments	\$115,797.25	.....
Real estate	479,785.99	.....
Advances to subsidiary real estate companies	3,208,360.66	.....
Securities—pledged	27,701,855.93	.....
Securities—unpledged	8,378,797.42	.....
		39,884,597.25
WORKING ASSETS:—		
Cash	\$13,149,152.16	.....
Securities issued or assumed—held in treasury	17,211,000.00	.....
Marketable securities	325,000.00	.....
Traffic and car-service balances due from other companies	163,023.21	.....
Net balance due from agents and conductors	1,124,512.38	.....
Miscellaneous accounts receivable	1,629,152.35	.....
Materials and supplies	3,865,345.77	.....
Other working assets	158,997.81	.....
		37,626,183.68
ACCRUED INCOME NOT DUE:—		
Unmatured interest, dividends and rents receivable		231,719.19
DEFERRED DEBIT ITEMS:—		
Advances	\$916,510.70	.....
Rents and insurance paid in advance.....	158,099.71	.....
Other deferred debit items.....	782,012.85	.....
		1,856,623.26
TOTAL ASSETS		\$182,719,411.51

LIABILITIES.

CAPITAL STOCK:—		
1,210,034 shares common stock, par \$50....	\$60,501,700.00	.....
2,126 shares preferred stock, par \$50....	106,300.00	.....
		\$60,608,000.00
FUNDED DEBT:—		
Mortgage bonds	\$67,639,000.00	.....
Collateral trust bonds	13,000,000.00	.....
Equipment trust obligations	5,200,000.00	.....
Mortgages on real estate	1,669.18	.....
		85,840,669.18
WORKING LIABILITIES:—		
Traffic and car-service balances due to other companies	\$71,027.06	.....
Audited vouchers and wages unpaid.....	3,715,180.04	.....
Miscellaneous accounts payable.....	188,718.29	.....
Matured interest, dividends and rents unpaid	396,325.50	.....
Other working liabilities	977,425.88	.....
		5,348,676.77

ACCRUED LIABILITIES NOT DUE:—

Unmatured interest and rents payable.....	\$908,956.31	.....
Dividends declared June 18, due July 12, 1913	3,030,400.00	.....
Taxes accrued	597,735.36	.....
		4,537,091.67

DEFERRED CREDIT ITEMS:—

Other deferred credit items.....	1,318,742.47	.....
PROFIT AND LOSS.....	25,066,231.42	.....

TOTAL LIABILITIES..... \$182,719,411.51

LEHIGH VALLEY COAL COMPANY.

REPORT OF OPERATIONS.

PHILADELPHIA, August 5, 1913.

The annual report of the operations conducted by The Lehigh Valley Coal Company for the fiscal year ended June 30, 1913, and statements indicating its financial condition at the close of the year, are herewith submitted.

The total net income of the Company from all sources, after deducting charges for royalties, sinking funds, depreciation of the property and interest on the funded debt, amounted to \$1,471,274.87, an increase of \$309,033.55 as compared with the preceding year. This does not represent a normal increase, however, owing to the fact that the revenues of the previous fiscal year were reduced by reason of the suspension of mining during the months of April and May, 1912, pending negotiations for a new agreement between the anthracite mining companies and their employees.

The production of anthracite coal from the lands owned and leased by The Lehigh Valley Coal Company, including that mined by tenants, was 8,860,032 gross tons.

The percentage of sizes above pea produced by the mining operations of the Company was 68.68 per cent., an increase of 1.01 per cent.

The number of breaker hours worked was 47,014.

From the Snow Shoe lands 350,105 gross tons of bituminous coal were mined, an increase of 70,021 tons.

The property of the Company has been fully maintained throughout the year. The sum of \$312,211 was expended for additions and betterments.

A new breaker is in course of construction at Franklin Colliery to replace the old breaker at that point, which is worn out. It will be constructed of fireproof material and will have a considerably greater capacity than the old breaker. The same will be placed in operation at an early date.

The work of modernizing the breaker, boiler plant and other important machinery at Park Colliery has been carried on throughout the year and in such a manner as to interfere but little with the regular operation of that colliery.

The pumping plants at Exeter Colliery have been concentrated and enlarged, it having become necessary to increase the pumping capacity to overcome the greater amount of water encountered in the extensive mining operations conducted at that point.

At Sayre Colliery the pumping plants have also been concentrated and improved.

An electric haulage plant has been installed at Packer No. 4 Colliery.

The erection of a new washery to re-work the culm banks on the west end of the Delano lands is under way and will be completed during the coming year.

Complying with the decision rendered by the Supreme Court of the United States in the suit of the Federal Government against this and other anthracite mining companies, your Company is no longer purchasing coal from other producers under 65% contracts or any similar arrangement, and has no interest in any mining operations other than those conducted by it on its own lands or by tenants who lease lands from the Company.

In the past this Company has not had a comprehensive method of depreciating its property. The system prevailing was to meet depreciation by charging Income Account with varying amounts for improvements to the property and not adding them to the balance sheet as a capital asset. Thus not only was the value of the improvement liable to be lost sight of, but the depreciation was not measured by the actual mining of coal. Accordingly, after careful consideration and acting with the advice of expert accountants, beginning with the present fiscal year, a charge is being made to Income Account to measure the depreciation of the property on the basis of the amount of coal mined from the Company's lands, which depreciation is credited to a Reserve Account established for that purpose. Such additions and betterments as are made to the property are being charged to Capital Account and thus are properly set forth on the balance sheet. The accounts since January 1, 1909, have been revised on this basis as more fully appears in the Profit and Loss Statement.

No new capital obligations were issued by the Company during the year. The account appearing on the balance sheet as "Deferred Real Estate Payments," representing short term notes given for the acquisition of property in previous years, has been reduced by the sum of \$292,500. The total amount of such obligations now outstanding is \$800,000.

Payments amounting to \$109,379 were made to the sinking funds as required under the several mortgages on the Company's property.

The increase in Property and Plant represents, in the main, additions and betterments to the property, as heretofore mentioned.

An appropriation of \$50,000 has been made from the Profit and Loss Account and paid to the Company's Insurance Fund, making a total of \$110,547 in the latter account at the close of the year.

Current Assets are \$2,408,035 in excess of Current Liabilities.

Certified public accountants have verified the books and accounts of the Company and have furnished a certificate as to the correctness thereof, a copy of said certificate being appended.

F. M. CHASE,

Vice-President and General Manager.

PROFIT AND LOSS ACCOUNT FOR THE YEAR ENDED JUNE 30, 1913.

	Dr.	Cr.
Credit balance, July 1, 1912.....		\$3,486,636.86
Net income for year ended June 30, 1913.....		1,471,274.87
Improvements, January 1, 1909, to June 30, 1912, originally deducted from Income.....		1,407,916.93
Depreciation of Improvements, January 1, 1909, to June 30, 1912, inclusive.....	\$2,566,240.25	.....
Appropriation for Insurance Fund.....	50,000.00	.....
Miscellaneous adjustments	35,349.40	.....
Balance, June 30, 1913.....	3,714,239.01	.....
	\$6,365,828.66	\$6,365,828.66
Credit balance brought forward, July 1, 1913.....		\$3,714,239.01